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EDITOR'S NOTE

As we hope readers have long been aware, articles at the back of our issues are never there on a basis of relative merit. Often the reason is simply length, and this is emphatically true of Lewis Thomas' brilliant Root Lectures and of Nicholas Guppy's analysis and prescription on the grave problem of diminishing tropical rain forests. Both also reflect our concern for added coverage of science and science-related subjects, an interest underscored in our reader survey last year.

Such articles can also run into controversy of a scientific nature. This is shown in the letters in this Comment and Correspondence section challenging elements in the studies (published separately in *Science*) that were the basis of Carl Sagan's article in our Winter issue on the policy implications of a possible "nuclear winter." The problem is not a new one, for us or other publications. Just a year ago, for example, when we published Robert Bartley and William Kucewicz' marshalling of the evidence that the Soviet Union had engaged in biological warfare ("yellow rain"), we were well aware that there were contrary readings and that study and the collection of evidence were continuing.

Briefly stated, our test in both cases was whether the findings had reached a point where their thrust was widely accepted by relevant experts—and whether the authors presented their conclusions honestly. And in both cases we felt that public debate on the clearly important policy implications would not, could not, and indeed should not await definitive judgments on the scientific questions involved.

In the case of the Sagan article, the National Academy of Sciences has set up a special panel to review the matter. When that panel will report is not clear as we go to press, but we shall certainly keep our readers informed, though perhaps in a more summary form than would be appropriate in a magazine exclusively devoted to science.

The articles in FOREIGN AFFAIRS *do not represent any consensus of beliefs. We do not expect that readers of the review will sympathize with all the sentiments they find there, for some of our writers will flatly disagree with others; but we hold that while keeping clear of mere vagaries* FOREIGN AFFAIRS *can do more to inform American public opinion by a broad hospitality to divergent ideas than it can by identifying itself with one school. It does not accept responsibility for the views expressed in any article, signed or unsigned, which appears in its pages. What it does accept is the responsibility for giving them a chance to appear there.* The Editors.

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R. James Woolsey

THE POLITICS OF VULNERABILITY: 1980–83

As the Soviet Union has steadily improved its strategic nuclear and other military forces in recent years, it has become increasingly clear to Americans that the United States is vulnerable in a sense that was never true before the advent of nuclear weapons.

This type of vulnerability had its first major impact on the U.S. political debate following the Soviet conquest of Eastern Europe and development of nuclear weapons in the late 1940s and then, again, during our last great national paroxysm of concern about strategic and nuclear issues at the end of the 1950s and the beginning of the 1960s. But this third time around our reaction has been different and less sure-footed.

Our primary response, as a nation, to the first evidence of our new vulnerability was overwhelmingly positive. Dean Acheson, Arthur Vandenberg and other farsighted statesmen built a bipartisan consensus for the NATO Alliance even at the same time as our fears helped produce bitter political recriminations about other issues—e.g., "who lost China," and the responsibility for the Korean War.

The second major wave of public concern—over the Soviet space and missile programs, fallout, atmospheric nuclear testing, nuclear crises, the missile gap, and so on—was fueled initially by the Soviet launch of Sputnik in 1957 and then by Khrushchev's missile-rattling, the Berlin crisis of 1961, and the Cuba missile crisis of 1962. Our response as a nation to those events, and to the sense of national vulnerability and fear they produced, was extraordinary. We made a major and effective national effort in education with

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the National Defense Education Act; undertook the space program that led to the moon landings; and initiated two extremely successful and well-managed strategic programs: the Minuteman intercontinental ballistic missile (ICBM) and the Polaris submarine and missile. Neither was arms control neglected; the Limited Test Ban Treaty was negotiated and the first steps that led later to the Non-Proliferation Treaty were taken. Indeed, most Americans believed that it was not inconsistent for us both to build our national strength—whether with new high school science and math courses or with increased activity at the submarine construction yards—and also to work out agreements with the Soviets where such were possible and reasonable.

During the intervening years, however, the U.S. government was largely occupied by Vietnam and by undertaking significant increases in its domestic programs for health, social security and other social needs. In foreign policy, the years and the language of détente led a number of Americans to believe that peace had broken out in some fundamentally new way between the United States and the Soviet Union.

II

Events at the end of the 1970s starkly interrupted our reveries. Although there had been some concern as a result of earlier setbacks, the Soviet invasion of Afghanistan, together with the fall of the Shah and the Iranian hostage crisis of 1979–80, bludgeoned American consciousness at virtually the same time that we finally focused on the results of the Soviet military buildup of the 1970s. These events, and the impression of national weakness and drift they produced, played a major role in the 1980 presidential election.

The Reagan Administration took office riding upon what many of its members and supporters thought was a political wave as large as that which had begun to surge in the election of 1932—i.e., the first evidence of a political sea change. In its first year, the Administration concentrated heavily on domestic economic issues such as its program of tax reduction; it proposed major funding increases in ongoing defense programs, but left the clear impression that it would deal with arms control, Democrats, and other matters of secondary importance in its own good time. Events, its own mistakes, and its opponents conspired against such a schedule.

At the heart of the Administration's delays in coming to a position for both intermediate-range nuclear force (INF) talks and strategic arms talks (formerly SALT, now START) was a sound principle—

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namely, that arms control and strategy should work hand in hand. Many in the Reagan Administration reasoned that they could not sensibly develop an arms control position until they had in mind what strategy they intended to pursue and what major steps they planned with respect to strategic systems.

But the delays in reaching arms control positions proved to be very costly politically. The Administration announced its approach toward the INF talks—the "Zero Option" to prohibit intermediate-range nuclear missiles in Europe—in November 1981, over a year after the 1980 election. This delay, although shorter than the delay required to develop a position for the strategic talks (described below), apparently resulted almost entirely from the difficulties of getting started in this new area of arms control and from internal Administration disagreements. Even though there were no external causes for the delay, it took considerable time for the stasis to be broken by the then-weak National Security Council machinery. Those who remembered previous Republican administrations' behavior—either the domination of arms control policy, from the NSC, by Henry Kissinger or the expeditious decision-making in the same forum (flavored with a considerably greater amount of due process) under his successor, Brent Scowcroft—were amazed to hear of senior-level meetings on arms control where people just sort of came and talked and went away.

In 1981 it seemed that, in many ways, the Administration's laissez-faire views on the economy had carried over into important aspects of national security policy. Indeed cabinet-level and subcabinet-level officials during this period seemed determined to air their individual views on nuclear issues without giving careful thought to how their various musings would strike the public or affect the political debate. The low point was probably the public disagreement between the Secretary of State and the Secretary of Defense over whether U.S. plans did or did not call for a "demonstration" launch of one or a few nuclear weapons in the event of a conventional Soviet attack in Europe. But other officials also made their share of disturbing contributions to the public discourse—e.g., from the White House staff came an estimate of a "40 percent" chance of nuclear war, and from a Defense Department official came the suggestion that hand shovels could readily deal with the problem of nuclear fallout. To the public, including many friends and supporters of the Administration, it seemed that the government was taking the subject of nuclear war rather too casually. To those who wished to use such slips for their own purposes, the

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Administration's willingness to let a hundred flowers bloom on this most sensitive subject was highly welcome and gleefully exploited.

In the field of strategic arms control the delay in reaching a government position was even longer than it was for the INF talks and, at least in this country, even more politically devastating. From the beginning, the issue that bedeviled the strategic arms control decision was the problem of finding a basing mode for the MX missile and making arms control policy fit with it.

During the 1980 political campaign the Reagan Administration-to-be had become committed to the MX missile, but opposed to the basing mode (the multiple protective shelter, or MPS, system) that the Carter Administration had developed for it. This was probably in no small part because of political problems that were being created in the western states by the MX's imminent deployment there. In any event, the new Secretary of Defense convened a committee early in 1981, chaired by Nobel laureate Professor Charles Townes of the University of California, and asked it to develop a basing mode for the MX. The new Administration had spurned the Carter Administration's solutions; but, given the decision to modernize the U.S. ICBM force using a missile weighing nearly 100 tons, and given the need to mesh that deployment with an approach toward arms control, the Carter Administration had done its work reasonably well. The MX, based in MPS, and SALT II were not an ideal package, but the Reagan Administration was soon to learn how difficult it was to produce an alternative.

The Townes Committee from the beginning saw that the problem it had been handed was an extremely difficult one and not at all susceptible to quick solution. As it labored through the late winter, spring and summer of 1981, it came up with several possible ways to base the MX that, over the long run, might ensure that it would be adequately survivable in case of attack. The committee suggested that the most promising technical solution was to base the missile in an aircraft having great fuel efficiency and designed to be able to patrol (primarily over ocean areas) for long periods of time. Its technical studies convinced the committee that an aircraft could be designed to be roughly the same weight as a 747 or C5A but to have approximately ten times the fuel efficiency—by using composite materials, turboprop engines and a specially designed wing. It further felt that such fuel efficiency would make it feasible to keep a portion of these aircraft on airborne alert continuously (as was done, at considerable cost, with B-52 bombers for several years), giving a potential attacker a significantly different problem than

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would be faced by trying to attack land-based or sea-based missiles or bombers on airfields.

Such an approach was highly innovative, however, and the committee recognized that the survivability of such an aircraft would depend upon a careful assessment of future Soviet electronics, intelligence systems, and weapons that might be able to threaten it—and the possible countermeasures to these threats. Thus the Townes Committee recommended that other long-range solutions be investigated, including deep underground basing. It also suggested an investigation of basing the missiles in closely spaced and hardened silos so that any Soviet attack planner would face the complication of "fratricide," the phenomenon wherein one of his attacking warheads would destroy or disrupt the trajectory of others. In addition to these long-range possibilities, a significant majority of the committee was sufficiently concerned with the need to provide a hedge (in case none of the long-term solutions worked out), and sufficiently impressed by the need not to delay the MX program unilaterally in the face of Soviet strategic deployments and pressures on the NATO Alliance, that it made an additional recommendation: it called for MX deployment to begin in a small number of shelters, designed in such a way that these could be expanded into an MPS system if no other long-run alternative worked out.

As a technical and strategic group with a limited charter (essentially, "find a survivable basing mode for a 100-ton missile"), the Townes Committee did a creditable job. It seriously considered the notion—outside its formal charter but certainly not outside the realm of reason—of recommending the cancellation of the MX and the development, in its stead, of a small, single-warhead ICBM. Such an ICBM had been attracting able and articulate supporters for some years from across a wide range of the political and strategic spectrum, among them Herbert York, Paul Nitze, Senator John Glenn, Congressman Albert Gore, Albert Wohlstetter, William Van Cleave, Jan Lodal and Henry Kissinger. But no particular basing mode for a small missile commended itself then to the committee as superior to basing in continuous-patrol aircraft, and that mode was not radically more difficult for a 100-ton missile than for a small one.

These deliberations took several months and, when they were over, two things became quickly apparent. The recommendation of the majority of the committee to begin a limited, expandable deployment of the MX in shelters was popular in the Air Force but not in the Administration. The continuous-patrol aircraft was pop-

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ular in the Administration (at least at the top) but not in the Air Force.

The Air Force and the Administration each then proceeded to kill the other's solution to the MX basing problem. The Administration rejected the idea of beginning a limited, expandable MPS deployment, and instead vacillated among other short-term basing modes—putting the MX in Titan silos, in Minuteman silos, or in C5A aircraft. None of these seemed reasonable to the Congress in light of the uncertainty about a long-term solution. One after the other, all such interim solutions died aborning. The Air Force, and some civilians, were concerned about the need to develop countermeasures to protect the continuous-patrol aircraft. In any case, the Air Force was opposed to developing a fourth new big aircraft just when it was working to develop two new strategic bombers and a new long-range transport. It feared that one of them would be killed in Congress. It also wanted an MX basing mode with lower annual operating costs than would be required by any kind of basing in an aircraft. Thus the Air Force, and members of Congress who were impressed by its skepticism, ended the brief life of continuous airborne patrol.

These political difficulties were augmented by the fact that the Townes Committee had made no effort to broker a solution politically with the military services, the Congress, or other interested parties. Such had not been its charge. But it was now the end of 1981, and the Administration had no way to base its new ICBM and no position on strategic arms control.

III

By the beginning of 1982, the Administration and the Air Force finally began to work together and reached a tentative decision to proceed with a single basing mode for the MX—namely, closely spaced basing of MX silos, subsequently termed "dense pack." This basic concept was one of the long-term ideas that had been suggested, but merely for preliminary technical investigation, by the Townes Committee. About the same time, the Administration decided to postpone further the presentation of a strategic arms control proposal to the Soviets in light of the recent Soviet-sponsored crackdown on Solidarity in Poland. Thus it was May of 1982, one and one-half years into the Administration, before its original START proposal was put forward by the President.

During 1982 a new committee, of somewhat different composition but still under the chairmanship of the redoubtable Charles Townes, was asked by the Department of Defense to assess the

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technical feasibility of the dense-pack basing mode for the MX. Thus the second Townes Committee's charter was even more limited than that of the first. By the end of the year it had given the concept a carefully hedged and cautious technical approval.

The original START proposal advanced by the Reagan Administration in May was not the initial public success that the "Zero Option" had been for the INF talks. The START proposal was rather complex—in this regard somewhat like the SALT II agreement it was designed to replace. The original proposal also was silent on a number of points, proposed delaying bomber limitations to a later phase of the talks, and lacked a single clear underlying principle. The Administration thus left itself without a proposal that could be readily explained to the public—and also open to the accusation that it was seeking to use arms control to restructure Soviet military forces significantly and quickly by demanding large reductions in Soviet forces while proposing no effective limitations on U.S. forces (such as bombers) in return.

By this time in mid-1982 both the nuclear freeze movement and work on the American Catholic bishops' pastoral letter were in full swing. Both were closely followed in the media and both were widely taken to represent significant shifts in opinion on nuclear issues—one on the part of the public, the other on the part of a major (and heretofore, on military issues, relatively conservative) religious institution. The midterm elections in November 1982 could not be characterized as a catastrophe for the Administration, but they were doubtless not a pleasant experience. The Administration held its majority in the Senate, although a number of Republican senators were narrow victors in the face of challengers who supported the nuclear freeze and who heavily criticized the Administration and its supporters on nuclear questions. Freeze resolutions, in different forms, were passed in a number of states and localities. And, most importantly, the Administration lost a net 26 seats in the House of Representatives. The shift in support in the House was greater, moreover, than the margin of 52 votes suggested by this shift in 26 seats, because many congressmen who retired and were replaced by new members from their own party had been generally more conservative on defense issues than the newcomers.

In the lame-duck session following the 1982 election, the Administration—forced by the timing of congressional deadlines—submitted its dense-pack basing mode for the MX to Congress for approval. This timing and the complexity of the proposal (including especially the features dealing with fratricide) doomed it. It was

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roundly defeated in the House, 245 to 176, on December 7, 1982. Testing and production funds for the MX in the Fiscal Year 1983 budget were held up by the legislation until the Administration reported to Congress on strategic and arms control questions and until affirmative votes for the MX funds were obtained in both houses.

Thus, by the beginning of its third year, the feeling of confidence that had been present in early 1981—the conviction that the Administration had both the time and the public and congressional support to work its will on strategic programs and arms control matters—had wholly evaporated.

In these straits, the Administration took the requirement for a report to Congress as the occasion to form a presidential commission with a very broad charter to report to the President on the same issues. The commission, chaired by Lt. Gen. Brent Scowcroft (USAF, Ret.), who had been President Ford's national security advisor, was also charged to consult with Congress in developing its overall recommendations. Thus the commission that began to meet in January of 1983 under Scowcroft's chairmanship was formed in response to the political chaos of the previous two years on strategic and arms control questions. It was faced with a potpourri of technical, strategic and policy questions, and a political situation in which the executive branch was committed to the MX but the House of Representatives was thought to be 50–100 votes more opposed to the continuation of the MX program than the members of the previous, lame-duck session, who had decided by 69 votes in December to freeze the MX funds.

As the Scowcroft Commission began to deliberate, several matters became clear. First, the modernization of the U.S. ICBM force was at the heart of the strategic, arms control and political deadlocks. Other strategic programs were important—particularly improvement of our strategic command, control, and communications—but solutions to the other problems appeared to be reasonably on track and not exceptionally controversial. Second, a modernization program for the ICBM force was important; over the long run this was primarily necessary in order to ensure that the ICBMs would be survivable and could serve as a hedge against problems that might develop at a future time in the survivability of the submarine or bomber forces.

It struck a number of commission members, however, that the short-term nature of this survivability problem—the "window of vulnerability" that had been much discussed in 1979 and 1980—had been rather exaggerated. Careful study of some recognized

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phenomena indicated that the various parts of the strategic forces would probably contribute to one another's survivability for a period of time. In the case of the ICBMs, it was particularly important that it would be very difficult for a number of years to launch an effective simultaneous attack on the U.S. ICBM force *and* the U.S. bomber force—because of the different flight times of the different Soviet missiles that would be used in any such attack.

Third, whatever solution was adopted for ICBM modernization, it would have to be integrated closely with a reasonable approach toward arms control. Only if this were done could any modernization program have a decent chance of public and congressional support. Fourth, the major political problem was the conflict between the Administration and the Democrats in the House of Representatives, although the Senate could certainly not be ignored; early consultations with key members of both houses and a careful consideration of their views were essential pieces in the puzzle.

But what, indeed, was the puzzle? The commission implicitly decided rather early that its objective had to be to develop a framework for U.S. strategic force modernization and arms control that could stand the test of time. Only an approach toward both modernization and arms control that had some chance of surviving from one administration to another would be able to reverse the nation's now-chronic pattern of perpetual strife and resulting stalemate on these questions. Each Administration, when it came into office, had fallen into the practice of making major changes in its predecessor's strategic modernization programs and in its approach to arms control. Conservatives and liberals were also now in the habit of organizing mass movements, and building up their direct mail lists, by attacking one another's approaches toward strategic modernization and arms control. One could foresee an endless series of conservative campaigns similar to that in 1979–80 against SALT II, and a similar series of liberal campaigns analogous to the nuclear freeze, with neither side ever being able to muster the congressional consensus needed for either modernization or arms control (including particularly the two-thirds of the Senate needed to approve arms control treaties). Not only did all this bewilder the public and undermine any reasonable chance of obtaining the necessary degree of long-range bipartisan support, it also made the United States an unreliable negotiator of arms control agreements. The Soviets could reasonably look for opportunities to play one part of the American political system off against the other, and

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then complain when one Administration did not continue or stand behind agreements negotiated by the previous one.

If this was the overall problem, the plausible options for modernizing the U.S. ICBM force seemed three in number. One possibility was to try to modify and improve the dense-pack basing mode for the MX—primarily by using multiple shelters (although in a much smaller land area than had been the case in the Carter Administration's MPS system). This would assume that the MX was the future of the U.S. ICBM force—that the later basing improvements needed for long-run survivability were to be made for the MX system. Such an approach would probably have somewhat de-emphasized the role of fratricide among attacking warheads as a method of assuring MX survivability, and would have instead emphasized the hardness of the shelters and the role of deception as the missiles were moved among shelters within the limited land area. But the issues involved in assessing the degree of hardness that could be attained, the types of attacks that might be planned against such an MX deployment, and the measures and countermeasures that would be involved (including, probably, the need for ballistic missile defense) were quite complicated—in many ways even more complicated than the arguments about electronic measures and countermeasures needed to protect the continuous-patrol aircraft that had taken place during the Townes Committee's deliberations two years previously. Further, there was no assurance that congressional approval could be obtained for this sort of approach.

Alternatively, one might have considered canceling the MX altogether and developing a small, single-warhead ICBM in its place. During the intervening two years since the first Townes Committee's deliberations, this option had begun to appear somewhat more attractive. The Scowcroft Commission's charter was sufficiently broad to encompass such a solution. Experimental data were now available that indicated the possibility of building mobile launchers sufficiently hardened against nuclear effects that such launchers would have some reasonable survivability even if they were deployed only on large military reservations; their mobility would permit them to move off of such reservations in case of actual attack, thereby further significantly complicating the attacker's problem. Moreover, hardened silos or shelters for small missiles (and there was now also some evidence that significant increases in silo hardening might be plausible) might also provide a reasonable deployment method if an arms control agreement or other factors could limit the number of potential attacking warheads to a sufficiently low level. Whether deployed in hardened mobile launchers

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or in hard silos, a single-warhead missile was inherently a less attractive target than a large MIRVed ICBM. These considerations led to the notion that—if the commission's eventual recommendation indicated a shift toward small, single-warhead ICBMs—the arms control approach adopted by the United States should be one that encouraged both sides to move in that direction. (Indeed, the MX itself could be said to have been, in important part, a product of arms control regimes, such as SALT I and SALT II, that concentrated on limiting the number of launchers and thus created an indirect incentive to put as much capability as possible into each launcher and missile.)

The third option, and the one eventually adopted by the commission, was to proceed with a limited MX deployment in existing silos but to begin promptly the development of a small, single-warhead ICBM, to shift the long-range future of the U.S. ICBM force toward such a small missile, and to shift the arms control approach toward agreements that would promote such an evolution on both sides. This recommendation was thus a first cousin of the package suggested by the majority of the first Townes Committee two years previously, with the important difference that now the solution to the long-run ICBM survivability problems focused on the new, small, single-warhead ICBM.

The reasons for the limited MX deployment's being part of this package were both strategic and political. The strategic advantages included an earlier ability than would be the case with any other program to put at risk Soviet hardened targets and thereby to begin to match, sooner rather than later, the capability that the Soviets had deployed in their SS-18 and SS-19 ICBMs. Of great importance, however, was the political dimension of the problem. This meant politics in three senses: the politics of Americans dealing with one another (and the need to achieve a domestic consensus); the politics of the United States' dealing with its allies; and the politics of the United States' negotiating with the Soviet Union and deterring it from nuclear blackmail. On all three counts it was felt by the commission that the United States should not unilaterally cancel its only ongoing ICBM modernization program. The importance of putting together a solution that the Administration and other MX supporters could endorse, the importance of not asking our allies to deploy intermediate-range land-based systems while we would be canceling our own analogous strategic system on land, and the importance of having some bargaining leverage with the Soviets in the ongoing START talks, all militated against unilateral cancellation.

Early soundings with key members of the House and Senate at

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the beginning of the commission's deliberations indicated that a package such as the third option might be able to achieve enough support to pass the Congress. This was somewhat surprising, because many members of Congress had already expressed themselves as quite hostile to the idea of placing the MX in existing silos, as had, in fact, many members of the commission themselves. It was felt, however, that such opposition had always occurred in the absence of any clear agreement about a sound direction for the U.S. ICBM program over the long run. The commission came to feel that it was a reasonable bet that, when it was explained that such a deployment was only part of a package that pointed both the U.S. ICBM program and arms control in a very different direction for the long run, such an interim MX deployment in silos might be able to obtain the needed support. In order for such an approach to work, however, a number of members of Congress had to be convinced that the Administration was willing to undertake some major changes in its strategic programs, in its approach toward arms control, and in its attitude toward bipartisanship—particularly toward Democrats in the House of Representatives.

Consultations with Congress were early and extensive, including numerous breakfasts at Blair House in which the commission explained the options before it and sought the advice of members of both houses. There were many other meetings individually with senators and representatives, and with groups such as the Task Force on National Security of the House Democratic Caucus. The early participation of key Democratic House members—in particular, Les Aspin (Wisc.), Albert Gore (Tenn.), Norman Dicks (Wash.) and Thomas Foley (Wash.)—was central to this effort.

Following the commission's report and the President's endorsement of it, the Administration won its first test vote on the MX in May by a margin of 53 votes in the House, but the coalition in support of the commission's package was still a very fragile one. In the next House vote on July 20, the margin was reduced to 13 votes. By midsummer it became clear to the commission and the Administration, as well as to the supporters of the compromise package in the House and Senate, that some further steps were needed in order to hold support.

In the Congress, among some of the most influential of the Administration's supporters on this issue, there was particular concern that the Administration was not carrying out the commission's recommendations on arms control. Informal discussions took place throughout the summer, and on August 25 Congressman Aspin wrote to the commission urging that it take the lead in developing

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an approach toward arms control more concrete than the somewhat general suggestions that had been included in the commission report in April. Aspin's letter suggested that there could be some grounds for compromise between those who, in the Congress, had argued against constraints on missile destructive capacity (throw-weight) and those who, in the Administration, had argued for quick and sharp throw-weight reductions that would make necessary a major and early reconstruction of the Soviet ICBM force.

Aspin proposed gradual and phased throw-weight reductions. He also argued that the unique character of bombers and the weapons they carried should be taken into consideration in the U.S. proposal, and that bomber limitations should be balanced against limitations on missile destructive capacity. These two suggestions were central to the idea of forging a compromise on the Administration's START position between the Administration and a number of skeptical members of Congress.

Shortly thereafter, early in September, Senators Sam Nunn (D.-Ga.), William Cohen (R.-Maine) and Charles Percy (R.-Ill.) wrote to the commission, urging upon it a set of ideas compatible with those Aspin had advanced—and setting forth these ideas in the form of a modified version of the "build-down" approach toward arms control that had initially been proposed by Senators Cohen and Nunn. Central to the Nunn-Cohen-Percy approach was the idea that strategic arms modernization might, by appropriate arms control agreements, be channeled into more stabilizing directions. Such an approach differed fundamentally from the notion of a nuclear freeze that would seek altogether to halt strategic arms modernization. Nunn, Cohen and Percy suggested a "double build-down"—a steady reduction in ballistic missile warheads and a parallel reduction in the aggregate destructive capacity of ballistic missiles (throw-weight) and of bombers and their weapons. Such a build-down approach, it was urged, could be designed to give incentives to both sides to reduce their most destabilizing systems as they modernized their forces; this would mark a departure from trying to use arms control as an effort by either side to dictate the force structure of the other.

The commission, and particularly its chairman, functioned as a sort of matchmaker in many of these consultations between the interested members of Congress and the Administration. The six key senators and representatives who had been most involved in these discussions—Nunn, Cohen, Percy, Aspin, Gore and Dicks—sent to the Administration a set of arms control principles that the

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President endorsed and incorporated in a revised arms control approach announced publicly on October 4, 1983.

IV

It is too soon in early 1984 to assess whether this sequence of events and the approach toward arms control and strategic modernization that it produced will have lasting effect. The events of the late summer and autumn of 1983 included the Soviet destruction of a Korean airliner, the attack by truck bomb on the U.S. Marine headquarters in Beirut, and the U.S. military action in Grenada. In addition, as the U.S. deployment of Pershing II and ground-launched cruise missiles in Europe began, following formal approval by the West German government, the Soviets walked out of the Geneva talks on intermediate-range nuclear forces in late November and also declined in early December to set a date for resuming the Strategic Arms Reduction Talks in 1984. Most seriously for the Alliance, both the Social Democratic Party in Germany and the Labour Party in Britain—previously strong supporters of NATO—have turned against the INF modernization. Overreaching all of this is the continuing uncertainty about Soviet policy under Konstantin Chernenko, in the aftermath of the long illness and death of his predecessor, Yuri Andropov. Indeed—unless the Soviets should prove willing to negotiate a sound and simple agreement—1984 appears at this point to hold only bleak promise, whatever one's perspective on U.S.-Soviet relations, arms control, or the needs of strategy.

Nevertheless, the effort to work cooperatively with the Administration toward a common policy that has been displayed by the group of six members of Congress and a number of their colleagues may have been an important turning point in the U.S. strategic debate and the politics (both domestic and international) of nuclear weapons and arms control. This is not because the Soviets are likely to jump to an early acceptance of the full compromise build-down package worked out between the six members and the Administration during August and September of 1983, nor because the small, single-warhead ICBM is clearly assured of a successful and expeditious development. The problem of producing a positive and unifying overall national response, as we once did, to a strategic challenge by the Soviets is difficult, time-consuming, and multi-faceted. It will be much harder this time, and our beginning has not been nearly so smooth as it was in the late 1940s and late 1950s.

This time we must sort out far more basic issues than was the case either when NATO was being formed or in the aftermath of

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Sputnik. Our ethical dilemmas and disagreements are severe. Technology holds important perils for the survivability of important types of strategic systems. Thoughtful people disagree about whether arms control is part of the solution or sometimes part of the problem. Important new strategic questions exist about the vulnerability of our society's whole infrastructure to very limited (even non-nuclear) attacks and about the proper use of space. There is a major need to adjust the military forces in our key alliance, NATO, to take advantage of new technology, and to improve our conventional forces, while still maintaining the tie—historically dependent on our nuclear guarantee—to our European allies.

The search through this thicket—the search for a bipartisan national consensus such as that which built NATO and that which guided us at the beginning of the 1960s—will be extremely difficult. The central question is whether we have the will to make such a search—to begin again to work with one another, even on divisive strategic and arms control issues and even in today's climate. If we decide that we are willing, we must change our ways. If we are not, we must ask ourselves, what are are our prospects as a nation?

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Keith B. Payne
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NUCLEAR POLICY AND THE DEFENSIVE TRANSITION

On March 23, 1983, President Reagan delivered a televised speech to the nation in which he initiated a potentially radical departure in U.S. strategic policy. The President suggested that the policy of nuclear deterrence through the threat of strategic nuclear retaliation is inadequate, and called upon the vast American technological community to examine the potential for effective defense against ballistic missiles:

> Would it not be better to save lives than to avenge them? Are we not capable of demonstrating our peaceful intentions by applying all our abilities and our ingenuity to achieving a truly lasting stability? I think we are—indeed we must.
>
> After careful consultation with my advisers, including the Joint Chiefs of Staff, I believe there is a way. ... . It is that we embark on a program to counter the awesome Soviet missile threat with measures that are defensive. Let us turn to the very strengths in technology that spawned our great industrial base. . . . I know this is a formidable technical task, one that may not be accomplished before the end of the century. Yet, current technology has attained a level of sophistication where it is reasonable for us to begin this effort.[1]

The central problem of nuclear deterrence is that no offensive deterrent, no matter how fearsome, is likely to work forever, and the consequences of its failure would be intolerable for civilization. The President's call was a direct challenge to the offensive concept of deterrence that has dominated U.S. strategic policy for decades. That concept is based upon the simple and still widely accepted argument that neither the United States nor the Soviet Union will launch a nuclear first strike or engage in other highly provocative actions if both sides are vulnerable to nuclear retaliation. The President's speech suggested that vulnerability to a Soviet nuclear attack is not an acceptable condition in the long term, and that the

[1] The full text of President Reagan's speech is in *The New York Times*, March 24, 1983, p. 20.

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United States would examine avenues to counter the threat of nuclear missiles.

Following the President's speech, National Security Study Directive 6–83 mandated an examination of the technology that could eliminate the threat posed by nuclear ballistic missiles to the security of the United States and its allies. Accordingly, between June and October 1983, two studies assessed the technical and policy issues of a national commitment to ballistic missile defense (BMD). James C. Fletcher, former administrator of the National Aeronautics and Space Administration, headed a Defensive Technologies Study Team, and Fred S. Hoffman, director of Pan Heuristics (a policy analysis organization based in Los Angeles), led an extragovernmental Future Security Strategy Study. A senior interagency group integrated the two studies, and on behalf of Secretary of Defense Caspar Weinberger and then National Security Advisor William P. Clark, recommended a technology development plan to the President. The interagency group reportedly advised a vigorous research program to support an early decision concerning BMD development and deployment options, and recommended funding estimates for Fiscal Year 1985 through FY 1989 ranging from $18 billion to $27 billion. The interagency group apparently estimated the total cost, through deployment, of a multilayered defensive system to the year 2000 at approximately $95 billion; a recent Department of Defense study, however, has placed the cost of a laser defense for U.S. cities much higher.[2]

On January 6, 1984, President Reagan reportedly signed National Security Decision Directive 119, which authorized an expansive research program to demonstrate the technical feasibility of intercepting attacking enemy missiles. The President has requested $1.99 billion for the "strategic defense initiative" for FY 1985, a level of support that is $250 million above the budget figure for FY 1984.

Although a small core of strategic defense enthusiasts has always been present within the U.S. defense community, this level of officially expressed interest in strategic defense is an unprecedented development in recent U.S. strategic policy. The goal of actively defending the American homeland in the event of nuclear conflict has not received serious official endorsement since the 1960s. Also unprecedented is the fact that the President has set policy in front of technology. If the United States does, in fact, deploy a multilayered system for defense against ballistic missiles, it will be the result

[2] Reported in *Defense Daily*, November 29, 1983, p. 137.

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of policy leading technology, not the more familiar "technology creep" generating enthusiasm and a constituency for a weapons system which then "finds" a policy rationale as it is developed.

In essence, what would be involved would be a new direction in U.S. nuclear policy, a transition period of possibly two decades, involving a new and serious commitment to strategic defensive forces. Of course, such a commitment could not limit itself to countering the threat from ballistic missiles, but would also call for greatly improved capabilities to defend against strategic bomber and cruise missile threats.

Strategic defense has not been debated seriously since the anti-ballistic missile (ABM) debate of 1968–1971. Many of the technological, political and strategic factors pertinent to the old debate have changed considerably since then, but the key issues remain unchanged. They are:

—What role is ballistic missile defense expected to play;
—What effect will a commitment to strategic defense have on stability;
—What is the role of strategic offensive forces during and after a defensive transition;
—How are the European allies likely to react;
—What is Soviet policy concerning ballistic missile defense, and how is the Soviet Union likely to respond to an American initiative; and finally,
—What are the arms control implications of a defensive transition?

II

The role that strategic defense might play in U.S. national security policy is now a contentious issue. Should it be expected to provide an "astrodome" covering American military forces and cities comprehensively, or is a more limited objective acceptable, such as only defending U.S. retaliatory weapons? The criteria for defense effectiveness have profound implications for the research programs to be pursued and the types of defensive systems to be deployed.

For example, if a comprehensive defense for the American homeland is the only objective deemed worthy of the cost, then "exotic" defensive technology such as space-based, directed-energy beam systems or hypervelocity guns will be essential—technology that may take many years to mature. If, however, a more limited defensive mission is endorsed, such as the defense of U.S. retaliatory

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forces against a Soviet first strike, then more conventional ground-based systems incorporating radars, infrared sensors, and rocket interceptors would be appropriate. Proponents of the "astrodome" approach fear that the diversion of attention toward less sophisticated and less effective systems could harm the chances for the deployment of any defensive forces. They feel that the promise of a comprehensive defense of cities by exotic systems and the transcending of offensive-oriented deterrence is a goal that will capture the imagination and support of the American people—support that should not be jeopardized by discussion of limited defenses for U.S. retaliatory forces.

A limited defense for U.S. retaliatory forces, however, need not be inconsistent with a future exotic defense of cities. Indeed, the two roles and systems would be highly compatible, perhaps essential to a stable defensive transition. A comprehensive BMD system would require multiple defensive layers, including conventional earth-based rocket interceptors as well as exotic beam technology. Such a system would use multiple tiers of defensive protection, intended to intercept Soviet missiles during different phases of flight: the boost and post-boost phase, early and late mid-course, and the terminal phase of flight. More or fewer defensive tiers could exist depending upon the number and types of systems deployed. The layering of defensive forces into multiple tiers of interceptors could provide an extremely capable system for defense. For example, five tiers of defensive interceptors achieving 85-percent effectiveness in each layer would reduce the overall attack to less than .01 percent of the original number of attacking weapons. If 10,000 nuclear warheads were launched at the United States with such a multilayered defensive system in place, at most a single weapon would be likely to penetrate to its target.

Current, more conventional earth-based BMD technology is relevant to the interception of warheads at various points in the mid-course and terminal phases of missile flight, but it does not promise effectiveness in the boost phase, wherein an attacking missile would be intercepted prior to releasing its host of individually targetable warheads (MIRVs). Intercept during this stage exerts great defensive leverage over the attacking force because each missile destroyed eliminates all the warheads carried by that missile.

Nevertheless, near-term BMD technology could provide the means for the important lower tiers of conventional defense designed to defend U.S. intercontinental ballistic missiles (ICBMs), strategic bomber bases, and selected critical command, control and communication facilities. These ground-based defensive systems designed

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to intercept Soviet warheads in their mid-course and terminal phases of flight would likely be non-nuclear, i.e., they would not use nuclear-tipped interceptors, and could be available by late in this decade. The deployment of such near-term defenses for limited coverage would actually help to facilitate a subsequent commitment to a more comprehensive defensive system involving exotic space-based systems.

The period of transition to a comprehensive defense incorporating additional layers of more advanced defensive technology could require two decades or longer for full deployment of the systems. It must be recognized that this transition period could be dangerous if precautions were not taken to ensure political and strategic stability during that period. The Soviet Union, for example, is likely to achieve an initial temporary advantage in defensive capability given its existing extensive radar network and rapidly deployable ground-based BMD. A unilateral Soviet BMD system of even limited effectiveness could be highly destabilizing in the context of existing Soviet offensive first-strike capabilities and extensive air defense and civil defense preparations: the U.S. deterrent threat could be severely degraded by the combination of the Soviet first-strike potential to destroy American strategic nuclear forces and a Soviet defense against surviving American forces.

This combination of Soviet offensive and defensive capabilities could increase first-strike incentives during a crisis if Soviet leaders were persuaded that the U.S.S.R.'s defenses might be capable of largely absorbing the much-diminished U.S. retaliatory capability. Admittedly, Soviet strategic defenses on a modest scale could do little to limit damage against a coordinated and large-scale attack by undamaged U.S. offensive forces; but alerted Soviet defenses could be very effective in defending against a U.S. force sharply reduced in size and impaired by a Soviet first strike.

Thus, early deployment by the United States of a ballistic missile defense for its retaliatory forces would not only help to ensure the survival of U.S. strategic weapons, but would also assist in preserving the credibility of the U.S. offensive deterrent during an otherwise potentially unstable transition period. Even such limited conventional defensive coverage for U.S. retaliatory forces would create enormous uncertainties for Soviet planners considering the effectiveness of a strategic first strike, in addition to those longstanding doubts pertaining to the calculated effectiveness of their offen-

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sive forces.[3] In the context of Soviet defensive deployments, enhancing the survivability and potential effectiveness of U.S. retaliatory forces by means of both strategic defense and more immediate special "penetration aids" for offensive weapons would help to ensure that a transition to a comprehensive defensive capability could be pursued safely.

The crucial role played by U.S. retaliatory forces to safeguard stability during the initial phase of a defensive transition should also be clear. MX-Peacekeeper intercontinental ballistic missiles, a new small ICBM, B-1B bombers, cruise missiles, and Trident submarines are essential for deterrence stability during the decades of transition. New defensive weapons should not be considered a substitute for, or alternative to, the current modernization of strategic offensive forces; indeed, a strategic defensive initiative necessitates modernization of offensive forces to help sustain stability during the defensive transition. The leaders of the Soviet Union are likely to share this view.

Finally, a transition to a comprehensive defense for the American homeland would require the support of many Administrations and necessitate major technological advances. Completion of such a transition could be waylaid for technological or political reasons over the course of the decades that any such transition will require. As a result, each phase of a defensive transition must be valuable in and of itself, and should complement any subsequent investment in strategic defense. Early deployment of BMD coverage for U.S. retaliatory forces would constitute the first phase of a comprehensive defensive transition; it would safeguard the process of transition, and would be strategically valuable on its own merits, even if subsequent phases were delayed or terminated for political or technical reasons.

An important by-product of a ballistic missile defense system, even of limited effectiveness, is protection of the United States (and Soviet Union) from the accidental launch of a missile. For both sides to be protected against an accident would be far preferable to the current condition which carries a very high risk that disastrous consequences would follow from any such mishap. Further, limited BMD could help protect the United States against lightly armed nuclear powers of the future.

[3] For example, a "light" area defense should be capable of defeating Soviet precursor attacks against the U.S. strategic command and control systems and of denying the Soviet Union the option of pinning down U.S. ICBMs in their silos so that they could not launch under attack. On the technical uncertainties for the offense, even in the absence of ballistic missile defenses, see Matthew Bunn and Kosta Tsipis, "The Uncertainties of a Preemptive Nuclear Attack," *Scientific American*, November 1983, pp. 38–47.

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There are dozens of technical possibilities for future strategic defense systems; the debate over the proposed defense transition is not about the prospective effectiveness of one or two systems. Faced with the very rich menu of technical options for defense, it is simply untenable to assert that "they" (ground-based conventional interceptors and beam weapons, and space-based or deployable directed- and kinetic-energy weapons) will not work. Very near-term technology almost certainly could effectively provide limited but important defensive coverage for U.S. strategic forces.[4]

The more sophisticated exotic technology necessary for a comprehensive defense, although still in its infancy in some regards, shows tremendous potential. Commenting upon the recent classified governmental studies reviewing BMD, the President's Science Advisor, Dr. George Keyworth, noted:

> We can now project the technology—even though it hasn't been demonstrated yet—to develop a defense system that could drastically reduce the threat of attack by nuclear weapons, not only today, but those that could reasonably be expected to be developed to counter such a defense system.[5]

All of recorded history has shown swings in the pendulum of technical advantage between offense and defense. For the strategic defense to achieve a very marked superiority over the offense over the next several decades would be an extraordinary trend in the light of the last 30 years, but not of the last hundred or thousand years. Military history is replete with examples of defensive technology and tactics dominating the offense.

In sum, different levels of defensive technology can make important, and distinct, contributions to strategic stability. The near-term role for limited ballistic missile defense suitable to the technology likely to be available soon would be to provide protection for the U.S. nuclear deterrent and perhaps protection of the nation against small or accidental attacks. As the initial phase in a transition to comprehensive BMD coverage, defense of U.S. retaliatory forces would help provide the stability necessary for the long-term development of the more effective systems needed for a comprehensive defense of U.S. cities. If the technology for effective city defense proves to be attainable, then strategic defense can expand in scope and depth to provide coverage for urban and industrial America.

[4] For an excellent technical discussion that supports this claim, see Dr. Patrick Friel, "Status of U.S. BMD Technology," a paper presented to the annual conference of the American Association for the Advancement of Science, Washington, D.C., January 6, 1982. See also William Davis, "Ballistic Missile Defense Will Work," *National Defense*, Vol. 66, No. 373, December 1981, p. 16.

[5] Quoted in "Keyworth: Space-Based Defense Possible," *Air Force Times*, October 31, 1983, p. 29.

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If so, the limited coverage provided by earlier conventional ballistic missile defense will still be valuable, indeed essential, as a backstop against "leakage" through space-based tiers of defense.

III

What is the likely effect of strategic defense on stability? If the Reagan Administration (or its successors) cannot answer critics who charge that strategic defense would be "destabilizing," it will have little hope of generating or sustaining the necessary congressional and public support. During the initial phase of a defensive transition, stability could be safeguarded by defending U.S. offensive forces and by enhancing their potential to penetrate Soviet ballistic missile defenses.

A more difficult question concerns how stability would be maintained during the later phases of a transition wherein, theoretically, neither side could pose a credible threat to inflict very widespread nuclear destruction upon the other's homeland. Deterrence in the nuclear age has come to be understood in terms of mutual threats of nuclear devastation varying only in kinds of targets, i.e., counter-military, counter-industrial, counter-city, or all of these. The nuclear missile age has so far been an age of defenselessness against these threats. The question now is: could stability be maintained if the current condition of mutual homeland vulnerability were to be altered drastically?

Before addressing this question, it should be noted that neither the United States nor the Soviet Union could have complete confidence in their defensive systems. Exotic defensive systems could fail catastrophically under actual operational conditions. Very sophisticated systems, which must integrate numerous and complex component functions in the face of countermeasures, entail a degree of uncertainty. This uncertainty concerning the operational effectiveness of the total system could persuade leaders of both superpowers that an "unacceptable" level of destruction could still result from a clash of arms. The prospect of a catastrophic failure of the defense, or substantial leakage, should serve as a residual offensive deterrent. It certainly should preclude the possibility that any political leader would believe that the world had been rendered completely "safe" for large-scale non-nuclear war.

If, however, one assumes a very high degree of confidence by U.S. and Soviet leaders in their defensive systems, deterrence should still function, but it would no longer be the long-familiar deterrence from mutual vulnerability. The U.S. deterrent would rest on a defensive capability to deny plausibility to any Soviet

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"theory of victory." That is, U.S. defenses would thwart Soviet strategy and deny the Soviet Union its requirements for military and political success. These include: the destruction of U.S. military potential such that the Soviet Union, though not escaping damage in nuclear war, would survive, recover, and continue to function; the destruction of opposing forces in Europe; and the seizure of critical strategic assets world-wide.[6] Soviet military writers caution against any nuclear "adventurism" in the absence of a capability to meet these requirements for success.

This type of defensive deterrent is not totally removed from the current offensive-oriented deterrent. Currently the United States seeks to deny the Soviet Union its theory of victory by promising a devastating nuclear retaliation. In contrast, a defensive deterrent would deny the Soviet Union its theory of victory by ensuring its inability to defeat the United States—promising a long and potentially unwinnable war which could allow the vastly superior U.S., and U.S.-allied, military-industrial potential to come into play. Soviet leaders are acutely sensitive to the probable negative political consequences of such wars and are highly respectful of U.S. military-industrial potential. The prospect of waging a protracted war would be a deterring prospect for Soviet leaders. Perhaps most important, unlike the current condition, a defensive deterrent would combine the prospect for denial of Soviet victory with the avoidance of U.S. defeat and destruction.

It is difficult to compare the relative efficacy of offensive and defensive approaches to deterrence. The current offensive-oriented deterrent threatens dire short-term consequences, but its credibility is subject to grave doubt. Would an American President actually invite national self-destruction by unleashing U.S. nuclear forces in response to a limited Soviet attack (against U.S. allies perhaps), thereby triggering massive Soviet nuclear retaliation? Some reply with a cautious "yes," others with a skeptical "no." The point is that no matter how the United States refines its offensive-oriented nuclear strategy, it is apparent that American society could not withstand Soviet nuclear retaliation. Consequently, a solely offensive-oriented deterrent must lack credibility vis-à-vis most threats; its effectiveness is extremely constrained.

A defensive-oriented deterrent would not impose comparably dire short-term punishment, but there would be no doubt concerning the credibility of a defensive deterrent being used. Just as no

[6] For an examination of Soviet victory requirements, see John Dziak, *Soviet Perceptions of Military Doctrine and Military Power: The Interaction of Theory and Practice*, New York: National Strategy Information Center, 1981, p. 28.

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one questions whether NATO's conventional forces would fight if attacked, so there should be no question that strategic defenses would be used, particularly if they were of a non-nuclear kind. It is a matter of no small importance to have forces whose credibility of employment is 100 percent. While it is difficult to compare the relative efficacy of these different types of deterrents, there is one critically important distinction. In the event deterrence fails, extremely effective defenses could enable the United States (and perhaps the Soviet Union) to avoid a nuclear holocaust, while a purely offensive approach to deterrence virtually ensures a holocaust.[7]

In short, a transition to strategic defense would not be inconsistent with deterrence. Rather it would introduce a different approach to deterrence, an approach that could reduce both the probability and the consequences of nuclear war.

IV

A defensive deterrent would thus present powerful disincentives against a Soviet nuclear first strike. It is likely, however, to be less appropriate for the current policy of extending deterrence coverage to allies and global interests. The U.S. strategic nuclear threat, which is integral to NATO's "flexible response" doctrine, would be less deterring in the presence of Soviet strategic defenses. Moreover, the Soviet Union might believe that the potential benefits of conventional conquest in Europe or the Persian Gulf would be worth the risk if there were a strategic defensive stalemate with the United States. Indeed, control and exploitation of the industrial and energy resources of Western Europe and the Gulf may be seen by Soviet leaders as the way of overcoming their otherwise long-term structural economic disadvantages in the global competition with the United States, notably in the production of military high-technology items.

A possible solution to this potential problem is the same as that suggested for the solution to NATO's current over-reliance upon the threat of nuclear retaliation, namely the enhancement of NATO's conventional forces. That solution has been understood and advocated by every U.S. Administration for the past two decades. The European allies, however, have long resisted incurring the social and economic costs associated with providing NATO with conventional forces sufficiently large, well equipped, and intelligently

[7] The qualifier, "virtually," acknowledges the presence of the existing theory of damage control and limitation. To be specific, damage to the American homeland in war might be limited if the Soviet government chose to exercise restraint in its nuclear targeting.

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deployed to compel the Soviet Union to think in terms of a high-risk, high-cost nuclear attack. Instead, NATO Europe has preferred for years to rely heavily on a largely U.S.-provided nuclear deterrent. Should, however, the Soviets develop an effective strategic defense, the U.S. "nuclear umbrella" would appear much less fearsome to the U.S.S.R., compelling Western Europeans to seek an alternate means of preserving their security.

Thus, it is doubtful that America's European allies will ever be enthusiastic about a defensive transition in U.S. national security policy. They are likely to see it as a weakening of the U.S. commitment to provide a nuclear umbrella over Western Europe. Moreover, European countries confront a wider spectrum of threat than does the United States. A BMD system that effectively protected the United States *and* its European allies from strategic nuclear attack would still leave the Europeans vulnerable to conventional and some kinds of tactical nuclear attack. This asymmetry in vulnerability, and hence the perception of an asymmetry in American and European interests, could be exacerbated by a new U.S. defensive deterrence policy.

A defensive transition by both superpowers would also degrade, perhaps nullify, the British and French independent strategic deterrents. It was clear during the SALT I negotiations that the British and French wanted BMD limited to very low levels so that their relatively small independent nuclear forces would retain effectiveness. There is little to indicate that the British or French have a different perspective today.[8]

During a defensive transition, however, some of the allies might seek to parallel U.S. and Soviet efforts and acquire their own strategic defenses. French President François Mitterrand apparently indicated interest in strategic defense when he recently stated that a "European space community" with the capability "to fire projectiles that would travel at the speed of light" would "be the most appropriate answer to the military realities of the future."[9] The British and French may also adopt a more aggressive "penetration aids" program for their offensive nuclear forces to enhance their effectiveness against Soviet defenses. In the near- to mid-term, however, it would seem unlikely that independent European offen-

[8] See for example the discussion in Lawrence Freedman, "The Small Nuclear Powers," in *Ballistic Missile Defense*, Ashton B. Carter and David N. Schwartz, eds., Washington: The Brookings Institution, 1984, pp. 151–174.

[9] Remarks by President François Mitterrand at a luncheon offered by the Council of Ministers of the Kingdom of The Netherlands, The Hague, February 7, 1984. Embassy of France, Press and Information Service, Memo 84/6, p. 8.

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sive or defensive capabilities could compete successfully with those of Soviet forces.

On an objective analysis, there are some respects in which a defensive transition could enhance security in Europe. First, U.S. BMD technologies could help protect the Western Europeans from Soviet long-range theater nuclear weapons (such as SS-4s, SS-5s, SS-20s, and variable-range ICBMs and submarine-launched ballistic missiles or SLBMs). Given the relative ease of Soviet military access to Western Europe, such a defense would not be comprehensive, but it certainly could reduce NATO Europe's vulnerability significantly and provide a politically effective counter to the much discussed SS-20.

Second, if America is defended, the President is likely to see a lower level of risk involved in responding to a Soviet invasion of Europe than if America were naked to Soviet nuclear attack. This fact alone should significantly reduce any Soviet inclination to attack NATO Europe. Even though the United States could not pose an "assured destruction" level of threat against the Soviet Union in response to an invasion of NATO Europe,[10] the prospect of waging a long war for control of Europe with a defended and mobilized America could not help but be a highly deterring prospect. Thus, the U.S. "extended deterrent" over Europe could still be effective to an important degree.

Nonetheless, the reaction of major NATO countries to a U.S. BMD program would be likely to reflect the concerns already noted, as well as a fundamental difference between American and European perspectives on security. NATO allies have long criticized what they identify as the U.S. penchant for a technological rather than a political solution to security concerns. No matter how sound the strategic case for a defensive transition, many Europeans will be more impressed by the effect a defensive transition might have on the political foundations of the familiar East-West security system.

In sum, many Europeans are likely to prefer what they judge to be the political benefits of détente and an intact ABM Treaty to the strategic benefits that would follow a transition to effective strategic defenses. Ultimately the United States may have to decide whether concessions to the concerns of its allies about strategic defense are

[10] This assertion rests on the assumption that Soviet technical prowess in BMD is roughly equivalent to postulated U.S. prowess. Given the respective strengths of the superpowers as competitors in the area of military high technology, it is very possible that U.S. BMD will be significantly better than will Soviet BMD. Our argument does *not* require for its validity that the U.S. achieve and sustain a lead in defensive systems. But such a lead would have beneficial consequences for strategic stability.

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worth the price of forgoing the potential for a comprehensive defense and leaving the American homeland vulnerable.

V

How would the Soviet Union respond to an American defensive transition? Would the Soviet Union cooperate, tacitly or explicitly, with a defensive transition, by negotiated reductions in offensive weapons to ease the defense burden, or would it choose to compete comprehensively in an offense-defense race?

First, it should be noted that the Soviet Union has exhibited much more enthusiasm for strategic defense over the past two decades than has the United States. Soviet strategic defensive activities were roughly five times U.S. outlays in 1970 and increased to 25 times U.S. outlays in 1979.[11] While the United States drastically reduced its number of interceptor aircraft and de-activated its air defense, surface-to-air missile (SAM) batteries during the 1960s (on the argument that if defense against ballistic missiles was infeasible, there was little point in bomber defense), the Soviet Union modernized and increased its air defenses. While the United States reduced its commitment to civil defense to a marginal level, the Soviet Union expanded its civil defense efforts. Additionally, Soviet offensive-force modernization over the last decade has been directed toward achieving the capability to destroy U.S. retaliatory forces before they could be used—"active defense" in Soviet military parlance. It is apparent that the notion of defending the homeland is central to Soviet strategic thinking.

The Soviet Union has approached ballistic missile defense through two avenues. First, the Soviet Union has maintained, and is now modernizing, the world's only operational ballistic missile defense site around Moscow. Moreover, it has continued to upgrade its extensive network of air defense radars and interceptors (such as the SA-5 and SA-12 interceptors), giving them some capability against strategic ballistic missiles and intermediate-range theater nuclear missiles such as the Pershing II. The United States tried to address this possibility by including articles in the 1972 ABM Treaty prohibiting the testing of air defense components "in an ABM mode." This is a key area where the Soviet Union is alleged to have violated the letter and the spirit of the ABM Treaty by testing air defense radars and interceptors against ICBMs. Recently, U.S. photo reconnaissance satellites discovered a new, gigantic radar under

[11] Central Intelligence Agency, National Foreign Assessment Center, *Soviet and U.S. Defense Activities, 1970–1979: A Dollar Cost Comparison*, SR–80–10005, January 1980, p. 9.

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construction near Abalakova that is difficult to explain except as an ABM battle management facility. The location (far from the Soviet periphery) and the direction of this radar appear to be in direct violation of the ABM Treaty.

Second, the evolving Soviet ballistic missile defense research and development program accommodates directed-energy beam systems and a more conventional BMD system involving transportable radars and high- and low-altitude interceptors that could be deployed rapidly.[12] The combination of an existing infrastructure of large battle management radars, rapidly deployable BMD interceptors, and transportable missile site radars has led some in the intelligence community to conclude either that the Soviet Union is preparing to "break out" of ABM Treaty constraints and initiate a defensive transition, or is engaged in a "creeping" break-out, to be followed by rapid deployment of BMD.

Yet there are several reasons why it is unlikely that the Soviet Union would be the first to withdraw formally from the ABM Treaty and initiate an overt transition to ballistic missile defense. While the Treaty is in effect, the Soviet Union can continue to pursue its gradual upgrading of air defense to achieve greater ballistic missile defense capability, with less likelihood that the United States will react strongly. This sub-rosa avenue to greater strategic defense would permit the Soviet Union to avoid the political fallout and frantic U.S. response that would probably result from outright Soviet renunciation of the ABM Treaty.

Second, the Soviet Union obviously is aware that for the first time in two decades the United States is making a very serious commitment to explore the technical promise of strategic defense. Soviet leaders may suspect that the United States will petition for revision or withdrawal from the ABM Treaty within the decade. A prudent tactic for the Soviet Union would be to wait for such a U.S. initiative, and then to insist on significant U.S. arms control concessions in return for Soviet endorsement of the revisions sought by the United States. In this case the Soviet Union could achieve a major propaganda success with the charge that it was the United States that had sought to weaken or terminate this important symbol of détente, indeed, this perceived monument to the mutual commitment to prevent nuclear war. Given the enduring West European commitment to 1970s-vintage détente, the Soviet Union could

[12] For an excellent review of Soviet BMD activities see Sayre Stevens, "The Soviet BMD Program," in *Ballistic Missile Defense*, *op. cit.*, pp. 182–220. See also Department of Defense, *Soviet Military Power*, Washington: GPO, 1983, pp. 27–28, 68.

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further its traditional objective of dividing NATO by presenting itself as the defender of the ABM Treaty.

Finally, if the Soviet Union should "break out" of the ABM Treaty in the near term, it is almost certain that the United States would respond with deployment of a system based upon current defensive technology. U.S. ballistic missile defense research and development has focused upon ICBM defense for almost two decades, and it is clear that the defense of ICBM silos is within our grasp. The Soviet Union, however, has spent billions of rubles deploying its fourth-generation ICBMs (particularly the SS-18s and SS-19s) for the purpose of putting U.S. ICBM silos at risk. It also is quite clear that the Soviet Union signed the ABM Treaty substantially in order to forestall the potential of the U.S. Safeguard missile defense program, then under deployment to protect U.S. ICBMs from attack. In effect, the ABM Treaty provided Soviet SS-18s and SS-19s unimpeded access to U.S. ICBM silos. With MX-Peacekeeper ICBMs scheduled to go into silos in 1986, it seems unlikely that the Soviet Union would choose to surrender its ability to threaten U.S. ICBMs by abrogating the ABM Treaty. Such a course of action would be reasonable only if the Soviet Union were very confident in the ability of its defenses to intercept U.S. ICBM warheads. In that case, the Soviet Union would not have to rely on its offensive forces to destroy U.S. retaliatory forces and would need to be far less concerned about a U.S. capability to defend its ICBMs.

Given all of these considerations, it would appear unwise for the Soviet Union overtly to break out of the ABM Treaty regime. What then would be the likely Soviet responses to a U.S. defensive initiative? Our judgment is that the Soviet Union would be most likely to pursue a dual-track response—combining arms control and diplomatic initiatives with strong military programs. Such behavior would be in keeping with the traditional Soviet proclivity for pursuing arms control negotiations and a dynamic arms buildup simultaneously.

Specifically (assuming that the United States had gone ahead), the Soviet Union is likely to attempt both to deploy its own BMD systems and to provide effective countermeasures for its offensive forces in order to thwart U.S. defensive systems. If the Soviet Union seeks to maintain its nuclear threat against the United States and to provide strategic missile defense for its homeland, then an effort to provide offensive countermeasures to U.S. defenses is inevitable. If the Soviet Union were able to achieve the capability to nullify the U.S. retaliatory deterrent while maintaining its own offensive threat against the United States, it would have achieved a strategic

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condition of major military advantage. The United States obviously must guard against such a condition.

Some of the potential Soviet countermeasures include: an attempt to prevent the United States from deploying defensive weapons in space through direct military interdiction; an increase in the number of offensive weapons sufficient to saturate the U.S. defense; and passive protection of Soviet offensive forces to ensure penetration of U.S. defenses.

The first of these options is the least likely, given the risks involved in initiating a war of attrition in space, particularly if the Soviet Union hopes to deploy its own space-based defenses. The Soviet Union historically has not taken direct action in response to U.S. deployment of a new type of military system. A basic precept of Soviet policy is that war is a political phenomenon; it is not a proper response to an American peacetime weapons deployment.

Among offensive and defensive military countermeasures, the Soviet Union might attempt to increase its number of ICBM and SLBM warheads, intending thereby to saturate the U.S. defensive systems. A second tactic would be to attempt to sidestep U.S. defenses against ballistic missiles by increasing the bomber and cruise missile threat. The Soviet Union could also attempt to avoid all U.S. strategic defenses by emphasizing "unconventional" operations (e.g., crisis and wartime sabotage) involving nuclear, chemical or biological weapons.

Finally, the Soviet Union could attempt to provide "passive" protection for its offensive forces against U.S. defensive beam weapons. This could be done, for example, by hardening the missiles, increasing their speed of ascent and thereby reducing their time at maximum risk, adding ablative material to missiles so as to absorb the heat transferred by a high-energy laser beam, or even by spinning the missile during its ascent in order to reduce the dwell time of the laser beam.

If the Soviet Union lacked confidence that it could succeed in this high-technology competition, however, it would have greater incentives to pursue constraints on the United States through arms control. The ABM Treaty is an informative precedent. During the early 1970s the Soviet Union chose to limit U.S. superiority in ABM technology through arms control rather than by relying upon offensive countermeasures alone.

VI

This brings us to the question of the impact on arms control of a determined U.S. BMD program and of the likely Soviet response to

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such a program. Here the first question is the impact on existing arms control agreements, notably the ABM Treaty.

The United States and Soviet Union would have to revise the ABM Treaty to permit deployment of BMD systems of even limited effectiveness. A comprehensive defense would likely necessitate withdrawal from the Treaty, which Article XV permits on six months' notice.

The United States certainly has sound strategic and arms control reasons to reconsider its continued endorsement of the ABM Treaty. At the time the Treaty was signed, the United States established a clear linkage between offensive and defensive arms control limitations. Such a linkage made good sense; the United States could accept severe constraints on BMD, which might defend U.S. ICBMs and strategic bomber bases, if the Soviet offensive threat to U.S. retaliatory forces could be constrained and reduced on a long-term basis through arms control.

Thus, U.S. Unilateral Statement A, accompanying the ABM Treaty, stated specifically that a failure to achieve agreement within five years, providing for more comprehensive limitations on offensive forces than those contained in SALT I, could be grounds for withdrawal from the ABM Treaty. Unilateral Statement A also said: "The U.S. Delegation believes that an objective of the follow-on negotiations should be to constrain and reduce on a long-term basis threats to the survivability of our respective strategic retaliatory forces."[13]

Unfortunately the standard thus set by the United States for continued support of the ABM Treaty has not been met. Indeed, the Soviet offensive threat to U.S. retaliatory forces has increased dramatically since the signing of SALT I, and the signed but unratified SALT II agreement would not have eased the problem of strategic force vulnerability given the types and numbers of weapons permitted.

Yet the strict prohibitions on BMD systems that could defend retaliatory forces remain intact in the form of the ABM Treaty. Since the signing of SALT I, the United States has, to a large degree, dismissed the sensible linkage between offensive and defensive limitations established at those negotiations.

Thus, the United States and the Soviet Union do have the legal right to withdraw from the ABM Treaty, given proper notice, and the United States does have a strategic and an arms control rationale

[13] See U.S. Arms Control and Disarmament Agency, *Arms Control and Disarmament Agreements: Texts and Histories of Negotiations*, Washington: GPO, 1980, p. 146.

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for reconsidering the ABM Treaty. The Treaty should not be considered sacrosanct.

If the United States does decide to seek revisions to, or withdraw from, the ABM Treaty to permit extensive deployment of BMD, when would a change in the status of the Treaty be necessary? It is unlikely that revision or withdrawal would be required until relatively late in the 1980s. This is because the ABM Treaty constrains deployment much more severely than it does research and development.

The potential near-term BMD system that could provide limited but important defensive coverage during the initial phase of transition could run into trouble with the Treaty prohibition against testing, development or deployment of mobile BMD components (Article V); certainly actual deployment of any effective system would run afoul of the limitations of Article III, which restrict the number of permitted sites to two (amended to one site in the 1974 ABM Treaty Protocol) and the number of permitted interceptors and launchers to 100.

Although mobility would probably be sought in a near-term BMD system, to ensure survivability, the initial development and testing of subsystems need not be in a mobile mode, and the actual mating of these subsystems to constitute a mobile component or system need not occur until relatively late in the development and testing process. Thus there is no great urgency to revise the Treaty in the very near future. If the United States decides to proceed with the defensive transition, however, it should begin to examine the types of treaty revisions that are necessary, and the appropriate timing for those revisions.

The Treaty does allow great freedom for development and testing (but not deployment) of exotic beam defenses, particularly as long as these are tested from fixed, ground-based installations. Nevertheless, in the long run, if the United States decides to pursue comprehensive BMD coverage using multiple layers of defensive interceptors, the ABM Treaty will be unlikely to survive in anything resembling its current form.

On the other hand, neither the prospective near-term defensive systems considered here, nor later more sophisticated defenses, would require atmospheric testing of nuclear weapons.[14] Most of

[14] Presidential Science Advisor George Keyworth recently observed that there does not appear to be an important role for nuclear weapons involved in the transition to strategic defense. This comment was made during Dr. Keyworth's presentation at the Forum on The Future of Ballistic Missile Defense, Brookings Institution, February 29, 1984. His statement appears to be an authoritative refutation of the notion that a nuclear-pumped X-ray laser system would be a critical component.

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the technologies under consideration are non-nuclear and would not involve space-based "weapons of mass destruction" (i.e., nuclear, chemical or biological). Hence a defensive transition need not run afoul of either the Limited Test Ban Treaty of 1963 or the Outer Space Treaty of 1967, banning such weapons.

In sum, a defensive transition would compel initial revision and in all probability later withdrawal from the ABM Treaty. This could be done legally, and would not be inconsistent with the U.S. arms control position established at SALT I. But the most basic question is its broader impact on arms control efforts, particularly to limit offensive weapons on both sides.

In this broader context, there are several reasons why defense and arms control could be mutually beneficial. A defensive transition could establish a necessary basis for deep offensive force level reductions. First, even limited near-term defense systems designed to protect retaliatory forces could alleviate the verification difficulties associated with deep force level reductions. At current relatively high force levels a degree of ambiguity in the ability to verify an agreement is considered acceptable because only large-scale violations would have a "significant" impact upon the strategic balance, and such violations are likely to be noticed. Reducing U.S. and Soviet strategic arsenals to the level initially proposed by the United States at START (e.g., reportedly, a ceiling of 850 for deployed ballistic missiles) or lower, however, would place a higher premium on each delivery system. At much lower force levels even a relatively small level of noncompliance could have a significant impact upon the strategic balance, and thus be of great concern.

In the context of small numbers of U.S. retaliatory forces, the covert retention or deployment of even a few MIRVed ICBMs could be a threat to the survivability of an important fraction of U.S. deterrent forces, and thus provide the Soviet Union with an increased incentive to strike first. And the importance of very strict verification for deep reductions is incongruous with the increasing difficulty of totally monitoring the deployment of new types of nuclear weapons such as cruise missiles and mobile ballistic missiles. Consequently, in the absence of a defensive transition the U.S. insistence upon the ability to verify an agreement with very high confidence could reduce the chance for any deep arms reductions. A transition to strategic defense, however, would reestablish the condition wherein deception on a very large scale would be necessary before the strategic balance could be jeopardized by cheating. U.S. retaliatory forces that were defended would be less vulnerable

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to deceptively deployed Soviet forces—hence the need for very rigorous verification standards could be somewhat relaxed.

Second, it is clear that one reason for the Soviet commitment to large numbers of strategic weapons is to achieve a damage-limiting effect through offensive "counterforce" capabilities, i.e., the ability to disrupt U.S. command channels and to destroy U.S. retaliatory forces before they could be launched against the Soviet Union. It is likely that the Soviet Union has been so reluctant to agree to U.S. proposals for deep reductions in heavy MIRVed ICBMs because these weapons are the primary counterforce instruments in the Soviet arsenal. As noted above, damage limitation for national survival is a key objective of Soviet strategic doctrine, and that objective currently is pursued primarily through offensive counterforce preparations.

A defensive transition could provide the damage-limiting capability mandated by Soviet doctrine, with strategic defense replacing offensive forces as the principal means for limiting damage. Strategic defense could, in effect, take over the damage-limitation mission now given to offensive counterforce weapons. Such a development should reduce the long-noted reluctance of the Soviet Union to accept negotiated cuts in its large ICBM force.

Finally, if defensive technology proves to be extremely effective, it could reduce the incentives for the offensive arms competition by rendering it futile. The Soviet ballistic missile defense program of the 1960s probably was truncated because it became apparent that U.S. advances in MIRV technology would easily counter the Soviet defensive system. Thus, U.S. technological advances in offensive systems probably discouraged the Soviets from continuing to deploy what had become obsolete defensive technology. The development of highly effective defensive technology could, and logically should, have a similar impact upon offensive weapons programs.

Of course, a transition to defense could lead to a competition in the development and deployment of increasingly advanced defensive technologies. Nevertheless, restructuring the arms competition toward a "defense race" would have a benign impact upon the catastrophic potential of nuclear war, and would be far preferable to an indefinite continuation of the competition in offensive nuclear arms.

VII

In one other respect, related to arms control, a defensive transition could serve the interest of all mankind in a critically important

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fashion. A recent study on the "Global Consequences of Nuclear War" indicates that a relatively "small" nuclear war, involving between 500 and 2,000 detonations, could result in climatic changes that would trigger a global catastrophe.[15] That number of detonations would reflect the use of only a small fraction of the nuclear weapons in U.S. and Soviet arsenals. Strategic defense is the only candidate answer to this potential threat to humanity. Suggested alternatives simply are ineffective.

The most obvious and effective solution to this danger would be for nuclear weapons never to be used. However, it simply is not within the power of a U.S. President to determine whether a nuclear war will occur. Despite the best efforts of the United States to avoid nuclear war, the Soviet Union or another nuclear-armed country could employ nuclear weapons against the United States or a local foe. The first step in understanding this issue is to recognize that whatever the United States does, or does not do, cannot ensure the prevention of nuclear war. It is beyond reason to believe that all nuclear-armed powers would agree to ban the use of nuclear weapons and abide by that agreement under all conditions.

Equally incredible is the prospect for arms control to reduce the global arsenal of over 50,000 nuclear weapons to numbers below the threshold reportedly necessary to cause a climatic catastrophe. This does not mean that the arms control process has no value for the U.S. pursuit of strategic stability. Rather, what is suggested is that this avenue can hardly be relied on to prevent a climatic catastrophe that might stem from even a "small" nuclear exchange.

In sum, a defensive emphasis and nuclear disarmament are essential allies. Advocates of a radical scale of nuclear disarmament need to appreciate that truly deep reductions in offensive nuclear arsenals would be feasible only in the event of heavy deployment of strategic defensive systems. The United States could never verify strict Soviet compliance with a possible START regime that mandated reductions in offensive forces down to the low hundreds of weapons. But, with strategic defenses deployed, the superpowers could be confident that cheating would have to be conducted on a massive scale before it could provide a capability sufficient to yield important military or political advantage. If we assume that the United States and the Soviet Union will be political rivals for many years into the future, strategic defenses offer the *only* path to a nuclear disarmament agreement with which both parties could live.

A defensive transition—particularly one including the global

[15] See Carl Sagan, "Nuclear War and Climatic Catastrophe," *Foreign Affairs*, Winter 1983/84, pp. 257–292.

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coverage that space-based systems or components could provide—would reduce the risk of a global climatic catastrophe by intercepting nuclear weapons after they are launched. Given the fact that nuclear deterrence can never provide the certainty of stability, and given the reported possibility of climatic disaster resulting even from the limited use of nuclear weapoons, transition to a defense-dominant strategic policy should be seen as a moral imperative. At the very least, given the perils of the arms competition in offensive systems, the United States is obligated to seek to alleviate those perils through defense. Success in this venture is not guaranteed, but there would seem to be no excuse for the United States not making the attempt.

VIII

Whether defensive technology will be sufficiently robust to defeat potential active and passive countermeasures is an important issue, one which must be examined before critical decisions concerning development and deployment of potential defensive systems can be made. The preliminary conclusions in this regard, drawn from the recent official reviews of BMD, are quite optimistic about the potential for a robust defense against ballistic missiles. Ultimately, only time and further advanced investigation into the potential for defensive technology and offensive countermeasures will enable us to conclude whether the defense will become again the stronger form of warfare.

Unfortunately, though not unexpectedly, the debate that is shaping up promises to be yet another stale and unimaginative confrontation between those who judge homeland defense to be destabilizing and those who do not. Neither the government nor private commentators are well equipped at present with an understanding of how offense and defense can proceed together in complementary, synergistic fashion for the benefit of more stable deterrence. It is very desirable that those who are strongly committed to President Reagan's vision of an America defended against ballistic missile threats think constructively about the positive roles that U.S. offensive and near-term defensive forces can play both to safeguard the defensive transition and, perhaps, to help stabilize deterrence beyond the transition.

Neither superpower, at least in the early stages of an essentially competitive defense transition, is going to cooperate tacitly in assisting the defenses of the other side to achieve high effectiveness. The United States and Soviet Union have, after all, been involved in an arms competition expressing deep-rooted political rivalry. No

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matter how great the technical success of U.S. and Soviet defense transitions, the competition between offense and defense will not stop. Neither superpower is likely to abandon permanently all hope of gaining a major advantage by developing both effective offensive and defensive weapons.

One must assume that both the Soviet Union and the United States prefer a condition wherein *both* their offensive *and* their defensive capabilities are effective, to a condition wherein only their defensive weapons can perform as intended. Neither side, however, is likely to anticipate an enduring advantage in strategic offensive and defensive systems; both will be constrained to accept much more limited offensive targeting capabilities than now exist. Future missions for U.S. strategic offensive forces may include the following: guarding the defense transition; holding at risk so many high-value assets of the Soviet state that the Soviet leaders perceive a substantial net advantage in negotiating a major bilateral drawdown in offensive forces (thereby assisting the U.S. defense transition); providing an enduring hedge against sudden revelation of weaknesses in defensive systems; and providing some deterrent effect in order to help discourage gross misbehavior by third parties.

The public debate over the orientation of future U.S. strategic policy that was triggered by President Reagan's defense initiative proposal of March 23, 1983, has revealed all too plainly that there are more and less sensible ways to think about defense.

Strategic defense should not be viewed in terms of an all-or-nothing "astrodome." "Star wars" defenses, no matter how great their promise, will not constitute the last move in high-technology arms competition, and strategic defensive technology will not solve the fundamental problems of political rivalry. But strategic defense, embracing a wide range of near-term and far-term weaponry, promises to strengthen the stability of deterrence by imposing major new uncertainties upon any potential attack. In the long run, it holds out the possibility of transforming, though not transcending, the Soviet-American deterrence relationship.

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William E. Burrows

BALLISTIC MISSILE DEFENSE: THE ILLUSION OF SECURITY

Toward the end of what almost immediately came to be called his "Star Wars" speech in March of 1983, President Reagan concluded an impassioned defense of his arms budget by proposing that American scientists begin research on a very advanced system that could protect the West from ballistic missile attack by the turn of the century or soon thereafter.

"What if free people could live secure in the knowledge that their security did not rest upon the threat of instant U.S. retaliation to deter a Soviet attack; that we could intercept and destroy strategic ballistic missiles before they reached our own soil or that of our allies?," the President asked, rhetorically. The effect of the statement was to make public his belief that an effective ballistic missile defense (BMD) might well be feasible and, if so, that it could lead to an arms control breakthrough of monumental proportions while guaranteeing the safety of the nations of the Western Alliance.

The reference to ballistic missile defense was the catalyst for the creation of two blue-ribbon panels, composed for the most part of aerospace specialists from industry, think tanks, research institutions and the Pentagon. After spending the summer studying the problem, the panels submitted reports in mid-autumn which came to the conclusion that an effective ballistic missile defense is so promising that an initial five-year research effort is warranted at a cost of about $26 billion (or nearly as much as it took to land men on the moon). The goal, according to a combined report, is to have a multilayered ballistic missile defense in place within 20 years at a cost estimated at between $250–$500 billion. The panels' conclusions, which were heartily endorsed by Secretary of Defense Caspar Weinberger and applauded by the trade press, touched off a frenzy of activity within the industry and among a wide variety of defense-dependent research institutions.

It is not difficult to understand the initial appeal of the BMD concept. The possibility of assured protection against nuclear attack

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is undeniably attractive to large segments of the populations of the United States and many of its allies, who are becoming increasingly alarmed at the prospect of nuclear war. The proposed BMD also has considerable public relations value in that it appears at first glance to be purely defensive, rather than offensive, and could therefore easily be taken to be nonaggressive. Its advocates maintain that since its effectiveness depends upon self-protection, not upon the threat of retaliation (massive or otherwise), the Kremlin has no cause to fear it.

Yet, in fact, the "Star Wars" ballistic missile defense concept, or the Strategic Defense Initiative, as it was later christened, is a dangerous hoax and a cruel and potentially expensive exercise in self-deception. To believe that an adequate shield against nuclear attack is possible requires an extravagant faith in wishful concepts of high-technology defense, together with an extravagantly pessimistic assessment of the new offensive developments which would undoubtedly accompany any BMD initiative. To believe that a BMD program would help stabilize the arms race is to believe that the Kremlin would allow the United States to make itself invulnerable to attack at the same time that we are perfecting offensive systems which could pulverize Soviet targets with impunity. This defies reason. As the ballistic missile defense takes shape, so too will the means necessary to assure that it will not work as required.

A ballistic missile defense system would in fact fuel the arms race, not curtail it, by forcing the Russians to vastly increase the number and variety of their missiles and warheads, improve their quality, develop new ways of delivering them, perfect advanced penetration aids, and deploy specific counterweapons, such as anti-satellite (ASAT) systems, to thwart American defenses. An American BMD would, moreover, be staggeringly expensive to develop and produce, not only in terms of direct outlays, but as measured in the research and manufacturing time that could be invested more constructively in any number of other, more realistic, projects both on earth and above it. And not least, an American BMD effort would seriously damage American political credibility by violating the Limited Test Ban Treaty, the Outer Space treaty, and the extremely important Anti-Ballistic Missile treaty, while distracting interest and attention from far more important initiatives such as a comprehensive, verifiable freeze on weapons testing, which is what is really needed.

Ballistic missile defense is a contradiction in terms: the defense and the offense have forevermore become indistinguishable.

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II

In strategic bombing, the attacker has always held the advantage—if that term is defined by the rate of success in reaching the target and hitting it. This was the case in World War II because the offense usually had the benefit of some element of surprise, choosing where and when to strike. The attacker was also able to mount massive raids with hundreds of bombers that literally ran over the defenders in many instances or else skirted them altogether. The defense, on the other hand, was forced to spread fighter-interceptors and antiaircraft batteries thinly enough so that as many likely targets as possible had some measure of protection, though none ever really had enough.

The fact that strategic bombing was, with one exception, not decisive in the last war had far more to do with the relatively low destructive power of each bomb than with the number of them dropped. The exception, of course, was the double atomic attack on Japan. Only two of those bombs, both immensely destructive, were enough to convince Tokyo that further resistance was futile. Had the United States launched a single raid against the home islands with 1,000 B-29s, each carrying an atomic bomb, and had 998 of them been shot down before reaching their targets—a defensive feat without parallel in the history of aviation—the result would have been the same. The destructiveness of nuclear weapons and, to a lesser but significant extent, the speed and variety of their delivery systems, have served to increase the attacker's edge by an enormous margin. So few need reach the target where so many were needed before.

Although defense against ballistic missiles was actively contemplated by the United States as early as 1944 because of the German A-4 attacks against England, work actually began on the first real American anti-ballistic missile (ABM) system, Nike-Zeus, in 1956, in anticipation of the day when the Soviet Union developed its first intercontinental ballistic missile (ICBM). Between 1958 and 1961, however, a fierce technical debate raged over whether Nike-Zeus could function adequately in a saturation attack, discriminate between real warheads and decoys, and survive the destruction of its radar. President Kennedy finally decided that Nike-Zeus was not up to the task of protecting the nation against massive attack and ordered the program suspended.

But high-technology defense projects tend to have persistent lives of their own because of the engineer's infatuation with his creation and the corporate manager's unshakable belief that sooner or later

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national defense requirements can be shaped to depend upon whatever hardware is on the shelf or drawing board. And so it was with Nike-Zeus. The weapon was soon transformed into a component of a new system, Nike-X, which relied on a phased-array radar apparatus that could track scores of incoming warheads at the same time. Nike-Zeus was to be Nike-X's long-range interceptor while yet another missile, named Sprint, was to handle close-in defense of the silos in which ICBMs are based.

As the tide of relations between the United States, the Soviet Union and Communist China ebbed and flowed during the 1960s and into the 1970s, so too did plans for ABM systems. In 1967 Lyndon Johnson responded to détente with the Russians on the one hand, and conservative accusations of a "no win" policy in Vietnam on the other, by perceiving an ICBM threat from the Communist Chinese. Accordingly, he authorized deployment of Sentinel, which was basically a souped-up Nike-X, to provide a "thin" defense against attack from the Orient. (Since the Chinese had yet to test a long-range missile by that time, let alone deploy it in quantity, their offensive capability can be said to have been even thinner than the American defensive capability.) Sentinel was in turn canceled by President Nixon in 1969, largely because of the impending rapprochement with Communist China, but also because of public unhappiness with it and congressional exasperation with what it took to be the executive branch's aggressiveness and the Pentagon's seemingly uncontrollable appetite for new weapons. In addition, Sentinel was attacked by a sizable number of scientists who insisted that it would never work as advertised.

Sentinel, in its turn, gave way to Safeguard, which was repositioned to guard the routes it was thought Soviet ICBMs would use to strike the silos of their American counterparts. Unlike its predecessors, Safeguard survived a series of challenges by citizens' groups, the liberal press, congressional opponents, and the same scientists and intellectuals who had been attacking ballistic missile defense from the beginning. It became the only American ABM actually to be deployed, with a detachment going to Grand Forks Air Force Base in North Dakota to protect the Minuteman silos there.

Whether or not President Nixon really believed in Safeguard as an effective weapon, he did make skillful use of it in negotiations with the Soviet Union on the Anti-Ballistic Missile treaty that is part of the Strategic Arms Limitation Talks (SALT I) agreements of 1972. As amended two years later, the ABM treaty allows each side to have only one, fixed, land-based facility with no more than 100 missiles

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and launchers, and prohibits a reload capability. It also limits the number of large phased-array radars at the ABM site and prohibits the construction of others except along national borders. In addition, the treaty specifically prohibits the development, testing or deployment of mobile land-based, sea-based, air-based, or space-based ABM systems. It is the clear intention of the treaty to severely restrict ballistic missile defense capabilities and therefore to leave each side's retaliatory forces unchallenged.

The United States decided in 1975 that the expense of maintaining the solitary ABM battery at Grand Forks was not worth the negligible protection it offered, so the missiles were removed, leaving only the radar in operation. The Russians chose to deploy their allotted ABM facility for the defense of Moscow, and they still have it there. Although in the ensuing years both sides have been involved in research on lasers and other kinds of weapons that could be adapted to ballistic missile defense, that is pretty much where matters stood until the "Star Wars" speech.

III

The short, concluding segment of President Reagan's speech that earned it the "Star Wars" epithet seemed almost to have been an afterthought appended to a main text of far greater moment. It startled hawks and doves alike and drew immediate, reflexive rebuttal from many of the same columnists and scientists who have opposed BMD all along. But it just as quickly rekindled the notion that with the encouragement of the White House, a real defense against ballistic missile attack might finally be on the horizon or, at any rate, somewhere just beyond it. The speech amounted to a benediction for the Air Force, the aerospace industry, and the many research institutions that have been scrounging for federal funds since the end of the Apollo moon landing program.

There are a number of ways to fashion a ballistic missile defense, but the common denominator of the most favored concepts, including those presented to the President by the two special panels, involves the use of so-called directed energy weapons, such as lasers or particle beams, and very high speed pellet guns used in a multilayered, or tiered, defense in depth.

The idea, according to preliminary studies, would be to attack Soviet ICBMs continuously during every stage of their flight, which is in most cases about 30 minutes long. Particular emphasis, however, would be placed on hitting the boosters within the first five minutes of their having emerged from their silos. This might be done either by using directed energy weapons to burn holes in their

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skin or by smashing them, head-on, with salvos of high-speed pellets. Destroying the missiles immediately after they are launched, and therefore before they disgorge their independently-targeted warheads, would be far preferable to having to cope with ten or more times the number of warheads in the post-boost, mid-course, and terminal phases of flight.

The second layer of defense would involve attacking the separated warheads in mid-course. In the case of ICBMs, this phase would last for about 20 minutes, or as long as it takes the warheads to arc up and out of the atmosphere and then plunge back down into it as they bear down on their targets. Intermediate-range and submarine-launched ballistic missiles (IRBMs and SLBMs) would have shorter trajectories, of course, so the response time of the defense would have to be even quicker.

The third layer, variously known as point, or terminal, defense, would amount to a last-ditch attempt to stop the remaining warheads by firing nuclear-tipped rockets, probably similar to the old Sprint type, right at them at point-blank range. Dense salvos of pellets might also be used for terminal defense, according to those studying the matter.

As presently envisioned, the new BMD would depend very heavily on being able somehow to get near enough to the Soviet silos to hit the boosters at, or immediately after, lift-off. Ideally, the BMD would be able to attack about 2,000 boosters within 300 seconds of their coming out of silos and submarine hatches. Only lasers, particle beam weapons, or hypervelocity electromagnetic railguns, firing very dense fusillades of pellets at terrific speed, are thought by the BMD researchers to be fast enough to warrant serious consideration at this point. The Lawrence Livermore Laboratory in California is also working on a nuclear-pumped x-ray laser which would develop its energy from a nuclear explosion on the order of the ones that went off at Hiroshima and Nagasaki.

Where to put these weapons? There are three possibilities: in orbit, on earth, or both.

Space-based BMD systems have obvious advantages, because they would be poised for almost immediate response when an enemy ICBM attack is detected, and would require an absolute minimum amount of time to attack all of the ascending enemy rocket boosters. Plans for a space-based system generally envision the deployment of a fleet of permanently orbiting space battle stations, each weighing on the order of 100 tons and able to generate its own laser, particle beam, or pellet salvo.

The earth-based system would most likely involve the use of

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many widely scattered laser or particle beam generators firing at "fighting" or "mission" mirrors that would be sent into orbit on warning of an attack. The mirrors would redirect the energy beams at the rising boosters and at those warheads that separate from whatever boosters manage to leak through the first layer of defense. The angles of the mirrors, which would have to change in fractions of a second with extraordinary accuracy in order to deal with the heavy missile barrage, would be controlled either by their own sensors and computers or by surveillance and battle management satellites parked in geostationary orbit some 60,000 miles above the war. Since the relatively few surveillance and battle management satellites would be prime targets for enemy anti-satellites, it is safe to assume that the fighting mirrors would have to carry their own sensors and computers programmed with sufficient artificial intelligence so that they could carry on even if the master satellites were knocked out of action.

Serious consideration is also being given to the possibility of using a pop-up system in which the fighting mirrors would be mounted, collapsed, on Midgetman ICBM boosters and deployed on the northern periphery of the continent, and particularly in the Arctic. At the first indication from surveillance satellites that an enemy attack was imminent, the theory goes, the Midgetmen and their mirrors would be shot into orbit. The mirrors would then spring open, ready to direct the lasers at the rising Soviet missiles. Unlike permanently orbiting battle stations or fighting mirrors, the pop-up system would not allow the enemy time to draw a bead on it with its own lasers or counter it with other kinds of weapons, such as space mines.

Advocates of a new ballistic missile defense system point out, rightly, that research is barely beginning and that no sure technical route is at hand. The Defensive Technologies Study Team, one of the two groups that reported to the President last autumn, has recommended a $21.1-billion research and development program through fiscal year 1989, with special emphasis on surveillance, acquisition and tracking systems, directed energy weapons, battle management, command, control and communication systems, survivability and target hardness studies, "lethality," and support system concepts. In the weapons area, special attention is to be given to the hypervelocity gun, chemical infrared high-energy lasers, the nuclear-pumped x-ray laser, a free electron laser and a particle beam weapon, among others.

No one associated with the new BMD seems to believe that it would be 100-percent effective, though many claim that it could

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theoretically come very close to that by the time it is ready for deployment, in about 20 years. The Defensive Technologies Study Team has been quoted as reporting to the President that BMD does not have to be perfect to be worth its considerable cost. "Rather, defense [against ballistic missile attack] can meet the President's objectives by providing an incentive for the Soviet Union to reduce reliance on ballistic missiles and agree to arms control limitations on their numbers and capabilities."[1]

Even a cursory study of postwar relations between the United States and the Soviet Union suggests that the Kremlin's reaction to a serious American BMD would be quite the opposite of reducing its reliance on strategic missiles. In any case, how effective might the new ballistic missile defense be?

IV

The designers of the proposed system face some formidable challenges. The BMD would have to be able to stop a variety of warheads, including those delivered by ICBMs, IRBMs, and SLBMs. And, the "ballistic" in its name notwithstanding, it or a supplementary system would also have to cope with very large numbers of land-, air-, and sea-launched cruise missiles. All of those warheads—thousands of them, most about the size of a basketball—would be coming at the same time from almost every conceivable direction, at altitudes between 100 feet and 600 miles, and, for the most part, flying at very high speed. Stopping them would require a defensive system able to react with almost unbelievable speed and flawless lethality since, as has been indicated, the tremendous explosive capability of nuclear weapons means that even a tiny percentage of those that "leak" through the shield would wreak catastrophic damage on their targets.

The BMD would in the first instance have to rely on an extensive and extremely intricate "surveillance and battle management system" that would be able to provide accurate data on the enemy's preparations for a missile launch and then direct a lightning-quick counterattack over much of the Northern Hemisphere, including Eastern Europe and the Atlantic and Pacific Oceans. The crucial surveillance function would not only require highly advanced versions of the infrared early-warning and real-time imaging and acoustical satellites currently in use but, most likely, manned stations as well.

[1] Clarence A. Robinson, "Study Urges Exploiting of Technologies," *Aviation Week and Space Technology*, October 24, 1983, pp. 51, 55.

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And what of the weapons themselves? Permanently orbiting battle stations would not only be immensely provocative, they would also have a serious military disadvantage, as would orbiting fighting mirrors. The predictability of their orbits would allow the Russians ample opportunity to set up an attack from the ground using either lasers or large numbers of anti-satellite weapons in a concerted attempt to disrupt or nullify the defense. More likely, space mines would be sent into orbit near each of the battle stations or mirrors so that they could be detonated immediately before an all-out ballistic missile launch. The probable response to the mines would be to send up mine-killing attack satellites that would shadow the mines that shadowed the battle stations or mirrors, and so forth, ad absurdum.

The pop-up system also comes with thorny problems. Boosting the mirrors into firing position after the enemy missile launch but well before five minutes have elapsed defies probability. They would therefore have to be launched before the attack, based on warnings by the strategic surveillance apparatus. And that warning, as well as the signal to commence firing, would be determined not by humans, but by measurable criteria programmed into super-computers. In other words, events would move so quickly that computers would have to make the crucial decision to respond to whatever was perceived to be an attack.

But who would define the threat threshold for the computers and by what criteria? How close to a launch would the other side have to come before the computers ordered the Midgetmen to carry their mirrors to attack position? What would happen to all of those expensive missiles and mirrors, poised for the kill, if the Russians suddenly stood down at the end of what turned out to be nothing more than an elaborate exercise? What might happen if the computers were duped into launching the mirrors prematurely, only to have them attacked by mines or other anti-satellite weapons days or weeks later?

The obvious disadvantage of Livermore's nuclear-pumped x-ray laser has to do with the fact that it would destroy itself making that first shot. Were such weapons to be orbited, then, there would have to be one nuclear-pumped x-ray laser for each booster or, even worse, for each warhead. All of those nuclear explosions combined would very likely cause electronic pulse radiation sufficient to disrupt our own command, control and communication capability, hardened or not. Furthermore, testing of this system, which is the sine qua non of weapons development, would violate the treaty

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banning nuclear weapon tests in the atmosphere, in outer space and under water.

The preliminary plan suggests that terminal defense would depend upon either electromagnetic railguns or nuclear-tipped ABMs. This last-ditch attempt to fend off the incoming warheads would have to take place at altitudes of between ten and 35 miles. If railguns were used to stop warheads at such low altitudes, they would have to be placed at every possible target site in the country. If nuclear-tipped ABMs were detonated at such low altitudes, it can also be assumed that the target areas and surrounding countryside would suffer a substantial amount of blast damage and radiation exposure from the very weapons that were defending them.

None of this, of course, even takes into account the fact that the opposition would have 20 years or more to come up with countermeasures, including a variety of sophisticated penetration aids. The BMD would have to sort out thousands of real warheads from undoubtedly excellent decoys, while simultaneously being subjected to massive jamming and other kinds of interference, as well as false image projection. And if the Soviet Union really is ahead of the United States in laser weapons, an assertion frequently made by the Pentagon when research and development budgets are discussed, it is reasonable to assume that Soviet engineers already know quite a bit about protecting boosters and warheads from laser attack by deflection, hardening and other means, and will most probably learn a great deal more during the next 20 years.

Despite these problems, having to do with inherently severe technical limitations and with expected Soviet countermeasures, proponents of the new BMD claim that it is realistic to set a goal of ten-percent leakage in each tier and an overall leakage of only one percent. There is no indication, though, of how the calculations resulting in those numbers were made. This, in turn, raises the suspicion that the numbers are arbitrary and therefore utterly meaningless. To believe them, however, is to accept the notion that 100 of 10,000 warheads (not counting cruise missiles and bombers) would penetrate all of the tiers. If that were to happen, the United States would take 100 direct hits, most of them probably in the megaton range and delivered with considerable accuracy. The resulting death, sickness and destruction would be such that the nation would very likely cease to exist as a functioning society.

Dr. Jerome B. Wiesner, who was President Kennedy's Special Assistant for Science and Technology and went on to become president of the Massachusetts Institute of Technology, challenged the Sentinel system on both political and technical grounds 16 years

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ago. He took exception to the calculations that were offered to prove the ABM's effectiveness, and his observations, which are still valid, bear repeating now:

> When we design a system like the Sentinel and then analyze it, we assume almost idealized conditions. We assume it is going to work as specified, or we quite arbitrarily use some reliability estimate like .95. But we can't know whether that is even close to correct, because we have never built or operated anything like Sentinel before. . . . Here it is, the most elaborate, sophisticated, dynamic combination of rocketry, radars, computers, electronics, and other technology ever proposed, and we are expecting that it will work well, and not just well, but perfectly the first time it is tried in a large-scale test.[2]

> [The defender] sits and guesses about the attacker's tactics. If he guesses that one thing is going to happen, he invents a technology to deal with it. If he guesses that something else is going to happen, he invents another technology. But there is always the possibility that something quite unexpected will happen. I do not think the defender is ever going to know really what to expect; the variety of techniques available to a nation planning an offensive system is great enough to keep an anti-ballistic missile system of the kind we are talking about totally off balance.[3]

Not content to let their case rest solely on its technical merits, some who advocate Star Wars doctrine within the Department of Defense are also invoking the oldest shibboleth in the armament cycle: the claim that the other side is doing it too. Starting last August, even as the two special panels were gathering evidence to support BMD research and development, unnamed Pentagon sources began leaking stories to the trade press about accelerated Soviet research in ballistic missile defense and the sudden appearance of Soviet hardware that could be used for enhanced BMD operations in violation of the ABM treaty.

The first leak mentioned the erection of a new radar in central Siberia, near three of the Soviet Union's six SS-18 heavy ICBM complexes. Subsequent articles quoted anonymous Pentagon or CIA sources as saying that the Russians are developing and testing a rapid reload system for their ABM launchers in apparent violation of the ABM treaty; that they are producing antiaircraft and antimissile weapons as part of a pattern that "clearly shows that the Soviets are upgrading their ABM capability and could be preparing for a breakout of the ABM treaty," according to one official; and that they are conducting "vigorous" research in directed energy weapons for BMD. Still another leak had it that the Soviet Union in

[2] *Anti-Ballistic Missile: Yes or No?*, A Special Report from the Center for the Study of Democratic Institutions, New York: Hill and Wang, 1968, p. 5.
[3] *Ibid.*, p. 11.

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fact already has the major components in place for a nationwide ballistic missile defense system. "The Soviets may not be able to put up a laser battle station day after tomorrow, but the pace of their massive development program is causing genuine concern here in the White House," yet another unnamed official warned.[4] The last card, then, seems to show a "BMD Gap" which we will fail to close at our peril.

The genuine concern felt in the White House, however, does not seem to be shared by Secretary Weinberger, who has defended the Star Wars doctrine by suggesting that deployment of BMD systems by both sides would actually stabilize the arms race, not fuel it. "I would hope and assume that the Soviets, with all the work they have done and are doing in this field, would develop about the same time an effective defense, which would completely remove these missiles and the fears they cause," he said last summer.[5]

Soviet work on its own BMD has not been substantiated by anyone willing to lend his name to the accusation. Instead, there has been a flurry of insinuations, almost always phrased in the conditional, that are disturbingly reminiscent of the steady stream of distortions and orchestrated innuendo that served as the prelude to the Bomber Gap, the Missile Gap, the ABM Gap, and the MIRV (multiple independently targetable reentry vehicle) Gap. It might be usefully recalled here that the U.S. deployment of MIRVed warheads, which amounted to a major escalation of the arms race, was undertaken as a response to a Soviet ABM system that was in fact virtually useless. The pattern is by now familiar.

If the Russians *are* putting together a ballistic missile defense system, there is no reason to believe that it would work any better than ours, and it probably would not even be that good because of the Soviet Union's chronic difficulties with high-technology production (dire Pentagon warnings to the contrary). But a Soviet BMD would pose two problems, both of them political. First, it would provide the necessary rationale for accelerated work on the U.S. system, thereby starting the customary vicious cycle. In this case, the cycle would require each side's enhancing its offensive capability in order to overcome the other's defense. Second, it would contravene and therefore probably weaken or even end the ABM treaty, which is one of the linchpins of SALT and of arms control generally.

[4] See for example, the following articles in *Aviation Week and Space Technology*: "U.S. Scrutinizing New Soviet Radar," August 22, 1983, pp. 19–20; "Soviets Test Defense Missile Reload," August 29, 1983, p. 19; "Soviet BMD Moves" (Washington Roundup), November 14, 1983, p. 23; "Soviet BMD" (Washington Roundup), December 5, 1983, p. 15; "Soviets Accelerate Missile Defense," January 16, 1984, pp. 14–16.

[5] R. Jeffrey Smith, "The Search for a Nuclear Sanctuary (I)," *Science*, July 1, 1983, p. 30.

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Given the research and development frenzy which is surrounding our own BMD effort, expressions of outrage at the Russians seem somewhat disingenuous. Nor is the assertion that the United States is merely seeking to determine whether a BMD is feasible very reassuring. The program manager who will admit that five years of research and more than $20 billion have been wasted on an unworkable system probably has yet to be born.

V

There is every indication that, far from removing strategic missiles, BMD would force both sides to find more inventive ways to attack the other. Three days after the President delivered the Star Wars speech, Soviet leader Yuri Andropov said as much when he predicted that the deployment of such a system would be taken as "a bid to disarm the Soviet Union" that would propel the two nations into a "runaway race" in both strategic nuclear weapons and defensive systems against them.[6]

The most prudent reaction by the Kremlin would be the addition of new ICBM and IRBM complexes, thereby spreading out the targets that U.S. lasers and railguns would have to hit. There would undoubtedly be increased emphasis on production of ballistic missile submarines, equipped not only with depressed-trajectory SLBMs, but with cruise missiles that could almost touch the waves and would therefore be next to impossible to stop effectively. Since a BMD would be entirely dependent on an intricate system of satellite observation, communication, and target tracking, another likely Soviet response would be to develop an advanced ASAT system capable of knocking out satellites at far higher altitudes than is now possible. Given how dependent the United States is on reconnaissance and communication satellites, renewed Soviet emphasis on advanced ASATs would be taken as an extremely threatening development, and one probably necessitating the creation of an anti-ASAT system.

Finally, there would always be the suspicion that the Soviet Union had some means of effectively penetrating the BMD no matter how good it was thought to be, or that the system might not work as it was designed to at the crucial moment because of some unforeseen, massive glitch. Prudence would therefore dictate having a very large retaliatory force, probably about the size of the one currently on alert, to act as a backup deterrent, just in case.

The reader of plans for research and development of the BMD

[6] *The New York Times*, March 27, 1983, p. 1.

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will search in vain for any reference to studies of Soviet prospects for penetrating the system through their own technical advances. Nor is mention made of research on the Kremlin's real reaction to it, politically. The only studies listed for funding are those having to do with hardware, and the only hardware deemed important is American. Yet (to recast an over-worn phrase), the question of ballistic missile defense is too important to be left to the generals and technocrats alone. Perhaps the most revealing investment in BMD research would be the creation of an independent team of experts charged with devising, from a Soviet perspective, the most effective technical and political response to an American BMD. There is the nagging suspicion, however, that the system's proponents do not really want to know. Inventing new arms to counter still other arms remains, even after the lessons of postwar history, a more seductive endeavor than merely controlling them.

As Jerome Wiesner has recalled:

> In 1961, when President Kennedy first began to survey his military problems, his attention was drawn forcefully to an anti-missile system, the Nike-Zeus. He began to get a flood of mail, from friends, from Congress, from people in industry. The press pointedly questioned him about his plans to deploy the Nike-Zeus system. He began to see full pages for it in popular magazines like *Life* and *The Saturday Evening Post*, proclaiming how Nike-Zeus would defend America and listing the industrial towns that would profit from the contracts for it—advertisements, by the way, that were generally paid for with government money as contract expenses. . . . This pressure built up to the point where President Kennedy came to feel that the only thing anybody in the country was concerned about was Nike-Zeus. He began to collect Nike-Zeus material. In one corner of a room he had a pile of literature and letters and other materials on the subject. He set out to make himself an expert on the Nike-Zeus and spent hundreds of hours gathering views from the scientific community about it. In the end he decided not to deploy Nike-Zeus. Then something interesting happened. As soon as the decision was made against Nike-Zeus, everybody admitted that it was no good. People began to point out weaknesses in the system—that, for example, it was a system with very little discrimination between what it ought to intercept and the decoys fired to confuse it. Even Mr. McNamara said that to have deployed the Nike-Zeus would have been a very serious mistake.[7]

President Reagan would do well to seek far wider counsel on ballistic missile defense.

[7] *Anti-Ballistic Missile: Yes or No?*, *op. cit.*, pp. 7–8.

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Joseph S. Nye, Jr.

CAN AMERICA MANAGE ITS SOVIET POLICY?

American policy toward the Soviet Union has been replete with examples of incoherence and inconsistency. Responding in part to Soviet moves and in part to the political competition inherent in our democratic politics, American attitudes have alternated between overemphasis and underemphasis on the threatening nature of the Soviet Union. The result has been inconsistent policy and missed opportunities.

During the cold war, our exaggeration of Soviet capabilities prevented us from negotiating at a time when our position was strong. Subsequently, the ideological interpretation of policy and domestic political constraints prevented American policy from exploiting the diplomatic opportunities in the Sino-Soviet split for more than a decade after it occurred in the late 1950s. Conversely, the enthusiasm for détente in the 1960s and early 1970s led American officials to underestimate the Soviet military buildup, delay an appropriate response, and encourage false domestic expectations of future restraint in Soviet international behavior. Certainly, changing Soviet tactics have helped trigger American policy changes, but the exaggeration in American attitudes may develop as much from domestic political processes and reactions toward previous swings of the policy pendulum as from the actual changes in Soviet behavior.

In the early part of the 1970s, American power was limited by introspective moral and social concerns in the aftermath of Vietnam and Watergate. The United States spent less in real terms on defense, foreign aid, embassies and foreign broadcasting in 1980 than it did in 1960. Moreover, there was no political consensus on how to bring the non-military aspects of American power (such as our nearly two-to-one advantage in gross national product, our grain reserves, our advanced technology) to bear upon U.S.-Soviet relations. Different groups resisted linking issues or insisted on their preferred linkages. In these circumstances of shifting power, do-

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mestic disagreement, and ambiguous rules of conduct, it was not surprising that Soviet tactics were adventuresome.

By the end of the decade, American attitudes had changed again, well before the 1980 election and even before the Soviet invasion of Afghanistan. As American policies switched from détente to renewed hostility, one could not help but wonder how such changes occur, whether a policy with fewer oscillations would be more effective in managing the relationship, and whether the United States is institutionally and politically capable of following a consistent and coherent policy toward the Soviet Union.

II

The record of American policy since 1945 is far from perfect, but it has not been disastrous. Moreover, incoherence in the process may not be the key consideration. Effectiveness is more important than efficiency, and some periods of relatively efficient management may not have been the most effective. Could one not argue that despite its messiness, U.S. policy has been relatively successful in the postwar period?

At a high level of abstraction, the United States has sought three broad goals in its relationship with the Soviet Union: avoiding nuclear war; containing the spread of Soviet power and ideology; and gradually encouraging change in the nature and behavior of the Soviet Union. It is evident that the United States has been quite successful in the first of these objectives, and that it has also been successful, to a lesser extent, with respect to the second and third.

Nuclear war has been avoided as has all direct conflict (though not limited war with Soviet allies in Korea and Vietnam). Nuclear arsenals on both sides have grown greatly, but there have also been some substantial if imperfect efforts at arms control. Most important, the nuclear arms race has not led to nuclear conflict, and both sides have learned some prudent practices of crisis management since the Berlin and Cuba crises of the cold war period. Attributing credit may be difficult: the fact remains that war has been avoided.

Our success in relation to the second general objective, the containment of Soviet power and ideology, has been subject to more debate. There is the undeniable fact of increased Soviet military capability. During the cold war period the United States enjoyed a distinct nuclear military advantage, which it saw as balancing superior Soviet conventional capabilities. This strategic advantage was at its peak after the Kennedy buildup of the early 1960s. Faced with steady Soviet military growth, American policymakers in the mid-1960s concluded that trying to maintain strategic

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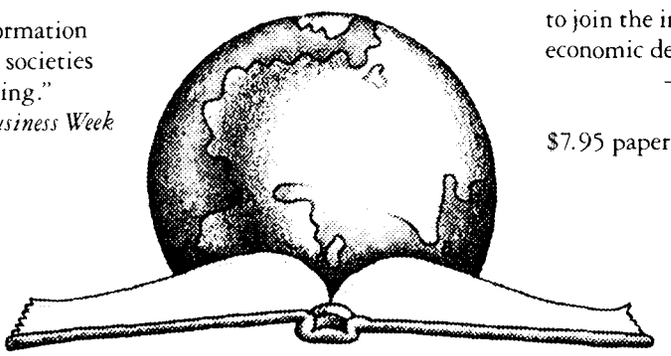

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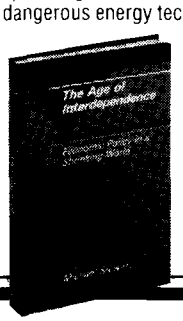

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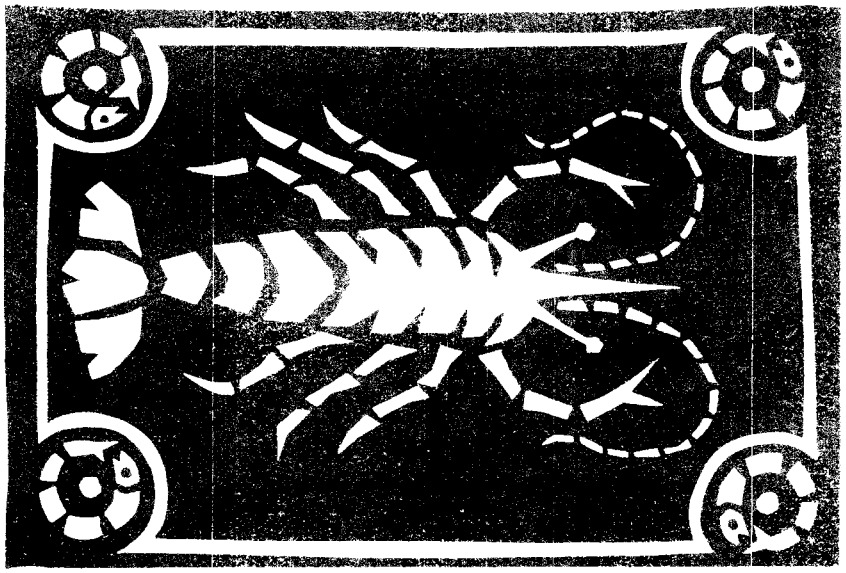

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superiority would be both infeasible and too costly to attempt. Subsequently, Vietnam and domestic turmoil diverted resources away from the strategic budget until Soviet gains in some categories, particularly land-based missiles (ICBMs), led some Americans to fear that even rough parity had been lost. While the significance of ICBM vulnerability is highly contested, and few American officials have expressed willingness to trade forces with the Soviet Union, most Americans agree that Soviet military power has greatly increased since the early 1960s. They have tended to disagree, however, over how inevitable that change was, and how significant it was for our foreign policy objectives.

American success at political containment is also debated in part because of ambiguities over whether the goal was the containment of Soviet power or of communist ideology. Some argue that communism is the threat, whether dominated by Moscow or not. From this point of view, the existence of Marxist regimes in Angola, Laos, Vietnam, Kampuchea, Mozambique, South Yemen, Ethiopia, Afghanistan and Nicaragua is a serious setback for American foreign policy. Moreover, even those who do not worry about the ideological coloration of poor countries would admit that some of these governments are more susceptible to Soviet than to American influence. This represents an extension of Soviet influence to areas far beyond its borders.

On the other hand, it can be argued that there has been a diffusion of power from both superpowers since the 1950s. In key areas such as Europe and Japan, the political appeal of Soviet ideology has greatly diminished since the 1940s and 1950s. Yugoslavia began the fracturing of Soviet ideological power, and the Soviets as well as the United States "lost" China. The Soviets as well as the Americans have seen Third World clients collapse and governments turn hostile. Moreover, marginal Third World gains are nowhere nearly as significant to the global balance of power as the fact that the key areas of Western Europe, Japan and the Middle East—while geographically closer to the Soviet Union—have remained politically closer to the United States. In addition, the Soviet empire in Eastern Europe is far from the politically secure bastion that the Soviets might hope. In short, while the United States has not prevented the Soviets from gaining some influence in the Third World, from a geopolitical point of view the Soviets have tended to win the small ones rather than the big ones.

In terms of economic power, while the Soviet economy grew impressively in the postwar period up until recently, so also did the American economy. In fact, in recent years, the Soviet Union has

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not closed the economic gap with the United States and still remains at little better than half the size of the American economy. Khrushchev's 1959 claims to overtake and bury the United States have turned out to be hollow boasts. Although American economic preponderance has declined in the postwar period, with the U.S. share of gross world product dropping from 33 percent to 22 percent of the total over the past 30 years, this relative decline has not been matched by a commensurate Soviet gain. On the contrary, the Soviet share of gross world product also declined in the past decade from 12.5 percent to 11.5 percent of the total.[1] Moreover, most of the American loss of relative share in world product went not to the Soviet Union but to our allies in Europe and Japan. The recovery of Europe and Japan was our deliberate foreign policy objective, in part as a means of combating communist influence, and our success in maintaining those alliances means that our loss has not represented a Soviet gain.

A third general objective of American policy in the postwar period, albeit one that has not been pursued at all times, has been to encourage change in the nature and behavior of the Soviet Union. This has varied from George Kennan's conception in the 1940s of waiting for Soviet power to mellow to the Reagan Administration's efforts to use economic pressures to accelerate change inside the Soviet Union.

There have been significant changes in the Soviet Union. While Lenin's authoritarian party structure remains, Stalin's excesses have been alleviated. Some of these changes have been influenced by contacts with Western society. Awareness of Western affluence and ideas stimulates popular expectations and makes it more difficult for Soviet leaders to portray America in terms of simple "demonology." It is far less certain, however, that deliberate American governmental efforts have had significant results in bringing about social change inside the Soviet Union, and in some instances they have had contrary effects. From time to time, efforts to foster emigration, internal liberalization and human rights through quiet diplomacy or increased contacts have had some marginal beneficial effects. But this third objective is a difficult one to manage when dealing with a society like the Soviet Union, and it may be just as well that, for the most part, this objective has tended to rank a distant third in our priorities.

Finally, one could argue that although oscillations have occurred in U.S. policy toward the Soviet Union, the behavior is not purely

[1] Herbert Block, *The Planetary Product in 1980: A Creative Pause?* Department of State, Washington, 1980.

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cyclical. Things never return to exactly where they were. And oscillations are more typical of some aspects of the relationship than of others. For example, if one looks at defense spending or public attitudes of trust in the Soviet Union, the oscillation is quite striking. But if one looks at trade and social exchanges, there has been a continuing upward trend rather than a reversion to the levels of earlier periods. The return to hostility since the late 1970s was not exactly the return to cold war which some observers had predicted. On the contrary, a residue of trade and contacts, as well as arms control negotiations and careful crisis management, makes the current period of renewed hostility quite different from the 1950s trough in the cycle of attitudes.

Thus an optimist could argue that the United States has not done all that badly in pursuing its major objectives in the U.S.-Soviet relationship over the past four decades. The optimist might argue that American policy has been like a drunk coming home from a bar. He may wander from the path from time to time, and follow a circuitous and inefficient route, but the important point is that he eventually reaches home.

A pessimist would be less complacent. Maybe we have just been lucky thus far. Some of the wanderings were prolonged and painful detours, and in a nuclear age there is always the danger of a disastrous fall into an open manhole. Moreover, the metaphor can be misleading in implying that there is ever an end to the continuing need to be attentive in managing the relationship. Even if one agrees that the postwar record has not been all that bad, there are significant past and potential costs to a policy marked by incoherence and inconsistency. Certainly the recent experience of negotiating major agreements in trade and arms control and then failing to ratify them, or of applying sanctions inconsistently, makes it difficult to build a long-term framework for managing the relationship. There are several reasons why an inefficient process is likely to have costs, if only the cost of opportunities foregone. It may be that equivalent or better outcomes could be achieved at less cost to our society if we followed a more coherent and consistent policy process.

First, oscillation and incoherence can be costly in terms of encouraging Soviet intransigence, as well as wariness about cooperative U.S. positions when we turn toward them. Desired Soviet responses to our tactical moves will be delayed if Soviet leaders learn that by simply waiting they will find that the United States will drop the tactic and turn to something else. In negotiations, after the Soviets reject an American proposal, parts of the American

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polity often spend their time bargaining publicly with each other rather than with the Soviet Union.

Second, and more dangerous, incoherence and inconsistency can lead to Soviet misperceptions of American intentions and concerns. Stalin must certainly have been surprised by Truman's reaction in Korea so soon after the U.S. secretary of state had declared it to be outside our defense perimeter. Khrushchev seems to have been surprised by Kennedy's reaction to the installation of Soviet missiles in Cuba so soon after accepting defeat in the Bay of Pigs episode. In the 1970s, the Soviets argued that the fall of Saigon and the failure to respond in Angola indicated that it was the vague Marxist notion of a historical change in the "correlation of forces" between capitalism and socialism which was compelling the United States to follow a policy of détente; they may have been surprised by renewed demands for defense spending and the return of a period of hostility at the end of the decade.

Soviet intentions are opaque to us because of Soviet secrecy. Our intentions may be opaque to them because of incoherence and cacaphony. If they are a "black box" to us, we may confuse them with "white noise." Efforts to sort out our intended from unintended signals and to understand the intentions of our policy must be difficult for the Soviets. For example, even practiced observers of the American scene disagreed on how to interpret the episode of an alleged Soviet combat brigade in Cuba in 1979—a clumsily handled incident that set back the ratification of strategic arms limitation talks (SALT II). Some saw it as an accidental product of the impending presidential election campaigns; others believed it was "no accident," but a signal that Carter had turned his back on détente and arms control. Sometimes creating uncertainty in the mind of an adversary can enhance deterrence. On the other hand, misperceptions may lead to unintended confrontations in which deterrence can break down. In dealing with a stronger Soviet Union in an age of nuclear parity, the United States may not have as much leeway for incoherence, inconsistency and inefficiency as we had in earlier periods. In an age when two such disparate societies aim 50,000 nuclear weapons at each other, the costs of miscalculation could be catastrophic.

A third cost of incoherence and inconsistency lies in weakening support from our allies and other countries. This might be called the "third audience problem." Most foreign policy issues involve at least two audiences. Political leaders try to mobilize domestic support for their policies as well as to send signals to foreign govern-

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ments. But an effective policy toward the Soviet Union involves more than just the U.S. public and the Soviet government.

Success in balancing Soviet power is dependent on allying major countries to the United States rather than to the Soviet Union, and the economic role of other countries is becoming increasingly important. An effective strategy for dealing with the Soviet Union cannot be considered in bilateral terms alone. With reduced American preponderance, more attention must be given to the concerns of allied and other countries. Oscillation and inconsistency confuse not only the Soviets, but also our allies, and make it more difficult to maintain a common position. Not only was it impossible to obtain allied agreement to cancel the natural gas pipeline from the Soviet Union after the United States had lifted its embargo against Soviet grain exports, but the effort to do so managed to turn an East-West issue into a West-West dispute and presented the Soviets with a political windfall. Of course, dividing the Western Alliance has been a longstanding Soviet foreign policy objective, and maintaining such alliances is a key to an effective U.S. policy toward the Soviet Union.

Thus, one can agree with the optimist that the overall management of the U.S.-Soviet relationship in the postwar period has not proven disastrous—but also accept the pessimist's argument that the past and potential costs of incoherence and inconsistency involved in the management of the policy are too high to allow one to feel comfortable for the future.

III

No foreign policy can be fully consistent. By its nature, foreign policy involves balancing competing objectives in a frustrating and changeable world. Every country faces a problem of relating ends and means—of defining its goals and interests so that they can be met within available levels of resources.

The inconsistency and incoherence in American foreign policy, however, are deeply rooted in our political culture and institutions. The eighteenth-century founders of the Republic deliberately chose to deal with the danger of tyrannical power by fragmenting and balancing rather than centralizing and civilizing the exercise of power. In a sense, a potential degree of incoherence and inconsistency in foreign policy is part of the price we pay for the way that was chosen to defend our freedoms.

In the constitutional "invitation to struggle" for control of foreign policy, the executive branch has certain natural advantages over the Congress. Even so, the Congress has a broad set of

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legitimate means to block, divert or alter foreign policy initiatives if it so chooses. The system tends to work best when two conditions are fulfilled: first, when the President has a relatively coherent strategy and a smooth policy process in the executive branch and, second, when there is a general executive-legislative compact, sometimes symbolized as "bipartisanship" in foreign policy. By and large, this was the situation during the cold war, when relative harmony between the branches of government rested on congressional deference to the President on the big things; sufficient centralization in the Congress to foster congressional leadership; and a general consensus on the Soviet threat.

But one should not idealize the cold-war policy process. The cold war era was marked by difficulty in framing and maintaining support for a strategy that established a consistent and effective relationship between ends and means in American policy. This difficulty was exacerbated by our liberal political cultural reaction to the harsh reality of Soviet expansion, and the resulting excoriation of the Soviets in our electoral competition. When liberal moralism faced the reality of amoral Soviet policy, there was a sense of shock and indignation. Analogies were drawn to the 1930s and Stalin was portrayed as similar to Hitler. In such circumstances, it was difficult to sustain Kennan's conception of selective containment by limited means since it depended on "the ability of national leaders to make and maintain national distinctions between vital and peripheral interests, adversary capabilities and intentions, negotiations and appeasement, flexibility and direction."[2]

The exaggerated threat described in the Truman policy document, NSC-68, called for means that were far in excess of what was domestically feasible—which in turn was part of the reason for the exaggeration. A gap developed between election rhetoric and policy implementation. The Republicans spoke of "rolling back" communism in 1952, but within six months Eisenhower adopted more modest goals and his fiscal conservatism led him to reduce the demand for military means. Similary, Kennedy came into office sounding like an echo of NSC-68, but later in 1963 he tried to adjust goals and means in a more modest direction in some aspects of policy (though not in Vietnam). In short, even in the cold war era when the parts of the political system worked relatively harmoniously with each other, that harmony had to be purchased at a considerable price.

In an effort to relate ends and means, Nixon and Kissinger

[2] John L. Gaddis, *Strategies of Containment*, New York: Oxford University Press, 1982, p. 88.

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developed a strategy that placed fewer demands on American resources. An opening to China was used as a means to encourage better Soviet behavior. Arms control agreements codified Soviet parity, but were also to constrain further Soviet growth at a period when our defense budget was under domestic attack. Trade and a web of cooperation agreements were tacitly linked to improved Soviet behavior in relation to Third World crises. The Nixon approach to détente was dictated not by goodwill toward the Soviet Union, but by the need to adjust to changes in Soviet military power and in American domestic conditions.

An effective foreign policy strategy must set forth a general long-run vision that combines a reasonable and persuasive assessment of Soviet intentions and capabilities, combined with a clear picture of our long-term goals and the feasibility of our means for achieving these goals. In that regard, the Nixon concept of a two-track approach combining selective containment with economic incentives made sense. Equally important, a strategy must include a third dimension, which is the domestic political acceptance of the strategy as desirable and feasible. In that area the Nixon-Kissinger strategy was not successful.

The usual explanation is that Watergate derailed the Nixon strategy. Watergate certainly had an effect in contributing to public mistrust and sapping executive strength. It may also have emboldened the Soviets to take greater risks. But the trouble with Watergate as a full explanation is that it pays insufficient heed to some of the deeper trends in the American political structure. Not only was the Nixon-Kissinger strategy overly ambitious in its broad definition of American interests, but it was difficult to implement in our political system. It relied on a degree of fine-tuning always difficult to manage. It relied on secrecy in a system in which the media is a virtual fourth branch of government. It depended upon personal control, which worked when things went well, but which left few congressional and bureaucratic allies to share the burden when things went poorly. Moreover, it provided insufficient points of access for allied countries to learn what was happening. Only when there is such access can allied leaders gradually adjust their policies without suffering public shocks that are jolting to democratic politicians.

Eventually the Nixon strategy succumbed to the typical American pressure to exaggeration as a means of building and maintaining consensus. It was not the more traditional exaggeration of the Soviet threat, but the exaggeration of the degree of change in the Soviet Union. Pressed by Vietnam and domestic turmoil, Nixon

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compensated by exaggerating the durability of the new structure of peace that was being created. Détente was oversold to the American public. The net effect was a sense of deception and disillusion in response to Soviet actions that, in turn, accentuated the ensuing swing of the cycle in the direction of renewed hostility.

At the same time, the domestic problems of the Nixon-Kissinger strategy were also related to the period. It might have been a more successful strategy in an earlier period, but by the late 1960s the American political constellation was undergoing profound changes that would have made any strategy difficult. A basic trend was the ideological realignment of the two major political parties that started with the Goldwater candidacy in 1964 and culminated in the Reagan election of 1980. During the two decades of realignment, party activists tended to pull the two parties away from the center. Not surprisingly, two of the casualties were the post-1941 bipartisan tradition in foreign policy and the related custom of deference to the President—two of the conditions that had helped to smooth relations between the separate branches of government in the cold war era.

In this period, American society was torn by reactions to the Vietnam War, reactions against the welfare state, the cultural changes of the 1960s, the revival of religious fundamentalism, and the economic and demographic rise of the South and West. Television played a role in forcing international news upon the non-internationalist majority of the public, and this increased the volatility in public attitudes. The corrosive effects on public trust of deceptive practices by Presidents Johnson and Nixon contributed to the development of anti-establishment attitudes.

Accompanying the rise of anti-establishment attitudes was the "democratization" of institutions. This took several forms. In the Congress, the weakening of seniority and the committee system opened opportunities for younger congressmen, but also weakened congressional leadership. The net effect was to make executive-legislative bargaining more difficult and to open the way for more enterprising congressmen (and ambitious staffs) to create surges in attention and neglect of various issues affecting U.S.-Soviet relations. In the society as a whole, the emphasis on participation and reduction in authority tended to erode deference to the President.

Thus the 1970s would have been a difficult period in which to implement any strategy of relations toward the Soviet Union, much less one that depended upon fine-tuning, linkage, secrecy and personal control. As the decade wore on and the conservative trend in the cycle of American politics strengthened, the domestic climate

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for détente worsened. Renewed hostility at the end of the decade was a product of the coincidence of a conservative trend in American politics interacting with a Soviet military buildup and the extension of Soviet-Cuban military influence in several Third World countries. Given the earlier American exaggeration of a benign shift in Soviet behavior at the height of détente, some increase in defense expenditures and toughening of attitudes was appropriate in the 1970s, but the subsequent degree of renewed hostility was strongly affected by domestic politics.

IV

Looking ahead, there are grounds to hope for improvement in our management of relations with the Soviet Union. Public opinion at the mass level is still centrist in its demands for a policy that balances "peace and strength," though mass public opinion does not weigh international issues very intensely and events can pull the non-internationalist opinion (of those little concerned on a daily basis) back and forth between its dual concerns. More important is the fact that the process of party realignment may be nearing its completion, with the attendant effect that party activist opinion may move back toward the center as the activists focus on winning the mass vote rather than struggling for the soul of the party.

If so, the result may be a return to stronger and longer presidencies. This would alleviate the discontinuities caused by the turnover of the top of the executive branch in our system following each change of presidency. In addition, it could improve the prospects for bipartisanship in foreign policy and thus ease the struggles between the executive and legislative branches. An optimist might add the hope that economic constraints and the lessons of the 1970s may deter the new Soviet leadership from peripheral adventures of the sort that proved such irritants in American politics in the last decade.

But even if the optimists are correct, there are still problems to be faced, as we saw from our inspection of the cold war period. The problems of exaggeration will remain—though ironically, if the optimists are correct, the next exaggerations may be of a benign change in Soviet policy rather than the current exaggeration of the Soviet threat. Developing a clear strategy for the long run is not easy in American politics. Indeed, it is difficult for Americans to think of relations with the Soviet Union as a long-term process to be managed indefinitely rather than as a near-term problem to be "solved."

The first requirement for successful long-term management is a

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flexible strategy that combines a sensible vision of the future and definition of our interests with appropriate means in a manner that can sustain domestic support. Since 1947, there have been variants of one basic strategy—containment. The broadest choice in strategy is between containment and totally new approaches. If one assumes that options such as isolation or a U.S.-Soviet condominium are not feasible in domestic or international politics, then there are two basic alternatives to containment; one in the direction of a more active confrontation with the Soviet Union and the other in the direction of a less active American role.

Those who are deeply pessimistic about our ability ever successfully to manage Soviet relations might be tempted to urge a less active American role. From this point of view, the only sensible strategy is to encourage the development of a multipolar world in which Soviet power will be balanced and contained by others as much as by the United States. So long as nuclear bipolarity is combined with ideological rivalry, the American public will remain obsessed with the Soviet Union, and election campaigns will press politicians toward exaggerations in the formulation of policy. In a truly multipolar world, one would logically have to consider the Soviet Union as a potential partner in shifting coalitions balancing Chinese, Japanese and European power. In such circumstances, our domestic politics could show less of a fixation on the Soviet Union, and policy might be easier to manage.

There are a number of problems with such a strategic vision. Our experience of multipolar balances comes from the pre-nuclear age. There may be greater dangers of miscalculation in the management of deterrence if coalitions shift quickly in the nuclear age. Moreover, even if the end result were desirable, it might be destabilizing to try to get from here to there, since the process could well involve the massive nuclear arming of Germany and Japan with uncertain effects on Soviet perceptions. In fostering such proliferation, we might be throwing wide open the lid on Pandora's nuclear box as others rush to emulation. Moreover, the benefits in terms of American politics and policies toward the Soviet Union may prove to be ephemeral. After all, there were ideological hostility and wide oscillations in our policies toward the Soviet Union in the period of multipolar balance before World War II.

There is a kernel of wisdom in the vision of the multipolar strategy. A degree of multipolarity exists at the political, if not the military, level. Containment of Soviet power is not a task for the United States alone, as Nixon's opening to China made clear. And the increased economic strength of Europe and Japan must be

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factored into any strategy. It is even conceivable that over the very long term, such a world may evolve. Yet a goal of creating such a world would not only be difficult to achieve: the mere setting of that goal would have the high cost of threatening the basis of the postwar alliance strategy that has worked so far, in return for uncertain domestic and international benefits in the future.

The other major alternative to containment is an active policy of confrontation designed to force change in the Soviet Union. At times the Reagan Administration has shown inclinations in this direction, though by and large the main lines of its policy have hewed to the existing path of containment. Those who urge a confrontation strategy offer a long-run vision of a Soviet empire in decline. Economic growth has slumped from six percent to roughly two percent a year. Corruption and inefficiency are rampant. Demographic trends could exacerbate the nationalities problem inside the Soviet Union, and there is restiveness in the empire in Eastern Europe. In these circumstances, it is argued, curtailment of trade and scientific exchanges and the threat of a new arms race could force the Soviets to change, or at least force the Soviets to turn from expensive external adventures to domestic economic reforms.

This strategy also raises fundamental questions. Is it prudent in a world of nuclear-armed powers to try to press an opponent to the wall? The reckless performance of Austria-Hungary on the eve of World War I would indicate that declining empires can be very dangerous actors in a balance of power. Moreover, do we really know how to bring about reform in the Soviet Union? Is there good reason to believe that faced with a choice, the Soviets will choose butter rather than guns? Or that they can be prevented from producing adequate guns? A recent CIA report indicates that "the ability of the Soviet economy to remain viable in the absence of imports is much greater than that of most, possibly all, other industrialized countries. . . . Consequently the susceptibility of the Soviet Union to economic leverage tends to be limited."[3]

Nor is it clear that in a period of low economic growth we have the means to implement such a strategy, either in terms of budgetary resources or in the curtailment of trade that is profitable to significant electoral groups like farmers, or to our allies. The effort to enforce such a strategy would certainly prove costly, yet the historical record shows that Soviet resistance is likely to be far more coherent and sustained than will be American persistence or consistency in the strategy. Once again, we are faced with a strategic

[3] Henry Rowen, Chairman CIA National Intelligence Committee, quoted in *The New York Times*, January 9, 1983, p. 16.

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option which presents formidable problems of feasibility combined with high present costs in return for very uncertain future benefits.

Thus the difficulties of the alternatives, both in terms of the uncertainty of their goals and the feasibility of their means, drive us back to the historically proven center ground of containment. But there are many paths among which to choose in the center, and the slogan of containment can be misleading. If containment is thought of as balancing Soviet power by a variety of political and diplomatic means, then it is merely the traditional common sense of international politics. But if containment implies a broad definition of American interests that leads to efforts to counter every Soviet or Soviet-allied action in the Third World, it would soon surpass our means, including the critical resource of domestic political support. The lesson of Vietnam is that an overly ambitious definition of interests which creates a gap between ends and means can lead to severe oscillations in foreign policy attitudes. One might label a centrist strategy as "containment with communication" or a "managed balance-of-power" approach.

V

The important point is that conflict with the Soviet Union is endemic in the structure of the bipolar relationship. Hopes to terminate the conflict quickly by accommodation or victory are unlikely to be realized. The problem is one of long-term management. At the same time, successful management of a balance of power requires communication and negotiation among the opponents. And a successful foreign policy for managing such a balance requires reliance upon multiple sources of strength—economic, political, military—and a selectivity in goals which relates ends and means. There are three principles to guide such a strategy.

First is the importance of a moderate design to insure that policy can be durable and robust. Some aspects of our policy process can be improved, but others are deeply rooted in our political culture and institutions. Our problems are more constitutional than organizational. There are no quick fixes. A basic principle for a durable strategy is to cut the coat of foreign policy to fit the rather rare eighteenth-century domestic cloth that we have inherited. The importance of this principle cannot be overstated: fine-tuning is impossible, secrecy difficult, oversimplification likely, and pluralism of views of the Soviet Union unavoidable. Thus a successful strategy must be moderate in three ways: in its definition of American interests; in its cautious rather than optimistic expectations of Soviet behavior; and in its assessment of American politics—meaning a

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hardheaded appraisal of what resources the electorate will devote to what interests and for how long. This does not mean a low profile in countering Soviet power. On the contrary, it means recognizing that only a moderate strategy will be robust enough to survive our domestic climate and durable in the face of any tendency toward pendular swings in attitudes. Only a moderate strategy will allow leaders to close the gap between ends and means. The point seems obvious until one reflects on how often we have failed to achieve it.

A second principle is that the Soviet Union is also unlikely to change quickly, but it does evolve slowly and unevenly. We will continue to be faced with a closed and secretive society which is difficult to understand. On the other hand, the Soviet Union has opened up somewhat over the past 30 years. There are more contacts. There is more sophistication in the perception of outside reality. There are more pinholes letting light into the black box. Moreover, recognition of this second principle helps with our domestic politics. Specifying a broadly shared long-range goal is an important precondition for giving legitimacy to the policy choices needed to undergird a durable strategy. Avoiding nuclear war by balancing Soviet power and gradually reducing the risks associated with nuclear deterrence is such a goal. If misperception and miscalculation are the conditions most likely to foster a breakdown of nuclear deterrence, then one of the long-term security objectives in our strategy should be to encourage that process of evolving transparency and communication.

The Soviet Union remains opaque to us, as a number of legislators noted when trying to decide on how to vote on the MX missile. "When you play cards against someone," noted Congressman Dan Glickman of Kansas, "you ought to know something about them. Unfortunately, our judgments turn out to be highly subjective for the most part." Or in the words of Senator Richard Lugar of Indiana, "We try to figure out where they're coming from, but it could well be the blind leading the blind."[4] Increased contact and communication can help to poke holes in the "black box" of Soviet society and gradually increase its transparency.

Change inside the Soviet Union will be gradual and hard to gauge, and we can at best encourage, rather than hope to guide it. Nonetheless, this possibility suggests that a managed balance-of-power strategy should involve routine and regular communication. From this point of view, our tactics should include engaging the

[4] "Gambling on the Russian Response to the MX Missile," *The New York Times*, June 4, 1983.

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Soviets in prolonged strategic discussions; holding talks at high level on force structure and stabilization measures; and efforts to consider crisis prevention techniques, not necessarily in the expectation of signing formal agreements, but as a means of enhancing transparency. It also follows that trade, scientific and cultural exchanges, and tourism should be evaluated by the same standard and not solely by the current criteria of economic benefits and short-term security interests. A managed balance-of-power strategy does not rest on expectations that increasing engagement will win Soviet trust or greatly constrain Soviet actions. Nor does it rest on any immediate liberalizing effects of "goulash communism." In the first instance, it rests on the importance of enhancing transparency and communication.

The third principle to guide a more consistent strategy is that indirect means of containing or balancing Soviet power are as important as our direct dealings with the Soviets. Both because the Soviets will resist efforts to change them quickly, and because our politics tend to undermine our own persistence in pursuing such efforts, our direct efforts will often face frustration. An indirect approach is more likely to succeed both at home and abroad. We may be most successful in containing Soviet power by constraining their opportunities in the rest of the world. Maintaining the Western Alliance has been the key to the success of containment thus far, and this is an area where the pluralism of American institutions can be a help rather than a hindrance by providing multiple points of access and reassurance.

The growing complexity of world politics, with more actors and issues, and the inevitability of turmoil in the Third World mean that we can never hope to completely control the milieu of world politics as an element in a strategy of containment. But a recognition of these problems and of the diffusion of economic power to our allies should reinforce our attention to the indirect dimensions of our policy in managing relations with the Soviet Union. A strong world economy with effective linking among the non-communist market economies may be a more robust economic strategy than one which tries to fine-tune East-West trade. An effective strategy rests on the comparative advantage of America's economic power and presence in the world economy as well as on the traditional political and military aspects of balancing Soviet power.

In addition to these basic principles, a managed balance-of-power strategy has important implications for dealing with the main issues in the relationship: defense, crisis management, trade and human rights. Managing the defense and nuclear issues is basic. A strong

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defense and clear signals are essential for an effective policy of deterrence toward the Soviet Union, and domestic and allied confidence in the strength of our deterrent is a necessary condition for all the rest of policy toward the Soviets. Uncertainty about security exacerbates the domestic debate and hinders effective steps toward arms control. The practice of exaggerating the Soviet threat as a means of generating support for the defense budget encourages inconsistency when the public eventually reacts to the exaggeration. To counter this tendency requires improving estimates, integrating arms control with defense planning, negotiating in smaller (but related) packages, and avoiding the rhetorical excesses that prove disruptive to retaining allied and domestic support for a consistent defense program over the long term.

In the area of crisis prevention and crisis management we should eschew large dramatic gestures and formal agreements such as those of 1972 and 1973, but engage the Soviets in quiet discussions of classic techniques (neutralization, buffer states, spheres of concern) for avoiding crisis escalation. Such talks could extend or be related to discussions of nonproliferation of nuclear weapons or of particularly dangerous conventional weaponry. Equally important will be efforts at home to redefine our interests in the less expansive terms of selective containment. As originally outlined by George Kennan, the most cost-effective way of containing Soviet power was through reliance on the nationalistic currents of other states. This entails learning to live with disagreeable regimes, and distinguishing those Third World situations where our interests would be deeply involved (e.g., Saudi Arabia) from those where they are less centrally involved (e.g., Southeast Asia).

A critical problem, of course, is maintaining domestic support for carefully graded degrees of interest in Third World conflicts, particularly since adventuresome Soviet policies such as those pursued in the 1970s may create a degree of American interest where none existed before. And such questions can become weapons in domestic political debates. Two devices can be used to prevent such debates from driving a managed balance-of-power strategy seriously off course. The first is presidential education of the public about the problem of limited ends and means. The second is a continuing quiet dialogue with the Soviet Union about the interests they should have in the process of crisis prevention, if they wish to avoid a repetition of the escalation in public hostility toward the Soviet Union in the 1970s with its concomitant effects on defense issues and trade. This is not the tactic of linkage; rather it is educating

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the Soviets in the inevitability of inherent linkage through a better understanding of public opinion in the United States.

As for the economic component of a managed balance-of-power strategy, we must avoid too ambitious an approach. While it is important to control a narrow set of technologies where we are sure of the direct military relevance, we know too little about the net effect on the Soviet economy and have too poor a grasp of our own or of allied political processes to engage in a policy of detailed linkage or fine-tuned leverage. The signals we would try to send would inevitably come across as too confusing to justify the costs that we would incur in trying to send them. Because interest groups will always be hard to control—witness Reagan's capitulation to the farmers—and the effects of restrictions on the Soviet Union are debatable, it is better to focus controls on those situations (such as trade in technology that shortens military lead times) where a clear and present danger is demonstrable.

Moreover, an effective policy of broad denial is simply not available at levels of cost acceptable to the Western Alliance—which remains a central factor in a balance-of-power strategy. Whatever Americans may think of the wisdom of their position, the Europeans and Japanese can be expected to weigh the economic dimensions of any policy toward the Soviet Union quite heavily. At the same time, any effective efforts at denial will increasingly require their cooperation. Since a broad denial policy is ruled out as infeasible and costly to Alliance relations, the United States should concentrate on obtaining Alliance agreement to restrict a narrow set of strategic technologies. It is critical that disputes over East-West economic ties not be allowed to disrupt an effective intra-Western trading system. In short, the American comparative advantage lies in strengthening the open international economy in which we loom large and the Soviets small, rather than squandering Western unity over futile efforts to prevent the Soviets from gaining any benefits from that economy.

Finally, we need caution and realism in our expectations of bringing about social and political change in the Soviet Union. An idealistic concern for human rights is a domestic American reality which a managed balance-of-power strategy must accept. Americans cannot live by balance of power alone. Nonetheless, a confrontational human rights policy is likely to be counterproductive in terms of the interests of Soviet citizens. Sometimes, however, minor improvements can be made through quiet diplomacy. In general, the fate of human rights in the Soviet Union is adversely affected by the worsening of the overall climate of U.S.-Soviet relations.

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Government actions that promote social contact and quiet diplomacy rather than public government efforts targeted at individuals or Soviet policies are more likely to serve both human rights and our long-term objective of enhancing the degree of transparency and communication in the relationship.

VI

Even if a managed balance-of-power strategy must be matched with American political reality, there are still some specific steps that might be taken to improve the quality of the fit. One device would be to establish a joint legislative-executive "Soviet assessment commission" to produce an annual assessment of the military, economic, and political aspects of the Soviet Union and its policies. Four members might be appointed by the President and four by the opposition leadership in the Congress. They might jointly select a ninth member to chair them. Their task would be to assess intelligence information and produce an annual report which would be the subject of annual hearings before the foreign affairs committees (or possibly a joint select committee). Such a report need not, indeed probably would not, be unanimous; but it could provide the focal point for debates which might well have a more central tendency than the current situation where zealous congressional staffers (usually from the wings of the two parties) work with executive-branch leakers to produce a national debate over estimates that stress extreme positions. For example, a commission could lead to a more careful discussion of the intelligence estimates on Soviet military spending that are currently often misused to support particular objectives.[5] While a Soviet assessment commission is not a panacea, presidential commissions have frequently worked to depoliticize issues in American politics, and this pattern might be adapted to an interbranch mechanism.

A variety of suggestions have also been made for organizational improvements of the executive branch's conduct of Soviet policy. For example, Marshall Brement, a State Department official with Soviet experience, has suggested the appointment of one official to oversee all aspects of the relationship; creation of a special bureau in the State Department; and improved development and use of expertise, including our Embassy in Moscow.[6] Others have sug-

[5] "CIA specialists responsible for Soviet military spending now say that their previous estimates of increases of 3 to 4 percent each year, after inflation, may be wrong and the rate of growth may have been no more than 2 percent." *The New York Times*, March 3, 1982, p. 1. The problems lie not in CIA methodology, but in political misuse of inherently uncertain estimates.

[6] Marshall Brement, *Organizing Ourselves to Deal with the Soviets*, RAND Corporation Study P-6123, Santa Monica, 1978.

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gested that centralization of control over special subjects such as technology transfer be located in the White House. Such organizational changes have their pros and cons, depending on the circumstances of particular administrations and the presidential style in foreign policy. But they are of minor importance when compared with the question of a clear executive process and the importance of having a single authoritative spokesman on foreign affairs. The Carter Administration developed a useful interagency coordinating procedure to inform the diverse arms of the executive branch of the various activities in U.S.-Soviet relations, but such a procedure was dwarfed in importance by the President's lack of clear strategy and failure to insure that only one person spoke for him on the issue.

The American system allows only one czar of U.S.-Soviet relations—the President—and he should either use his secretary of state as his sole spokesman or replace him. While the National Security Council must play a role in coordinating the efforts of many agencies, the role of the National Security Advisor should be restricted to that of facilitator of the policy process. Not only would this clarify who is in charge, but using the State Department provides more regular access for allies and a better use of our own expertise.

The issue of expertise in the executive branch is important. Although controversy over the U.S.-Soviet issue in domestic politics has always tended to tar the experts, that tendency seems to have grown worse in the past decade. Moreover, bureaucratic conflict in Washington increases the temptation to deal with the Soviet Embassy in Washington rather than go through the difficult process of clearing instructions to be sent to our embassy in Moscow. The result is to deprive ourselves of the benefit of important expertise. And the use of our embassy provides more occasions for our ambassador to make contact with top Soviet officials, as well as to insure that the messages are delivered in the terms that are intended.

Using our expertise is crucial when one is dealing with societies organized as differently as the United States and the Soviet Union. Soviet leaders are recruited by very different routes, and their frame of reference is unique to their own society. The temptation of mirror-image thinking even infects some intelligence analysts. The intelligence services have tended to share rather than counteract the assumptions common to Washington at any given time. The remedy must be a greater investment and broader institutional use

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and protection for people specially trained to understand the Russian language and Soviet political culture.

Greater public sophistication about the Soviet Union is also an important component of improvements that have been suggested at the attitudinal level. Educational efforts in schools and for the media can help. But most important is the President's use of what Teddy Roosevelt called the "bully pulpit." No other figure in the society commands the same attention. Presidents can help to shape public attitudes to expect less drama, fewer "solutions," and more consistent long-term management involving both conflict and cooperation in U.S.-Soviet relations. They can also stress the importance of a strategy which is more modest in defining interests, and combines balancing Soviet power (by various means) with communication and continuous engagement.

The way a president presents his programs can have a strong effect on the public attitudes that are necessary to sustain his efforts. Given that public opinion polls show sustained support for a policy of "peace and strength," a two-track policy would seem a natural one in terms of domestic as well as international politics. But the non-internationalist majority can be pulled back and forth between its two concerns by random events and electoral campaigns. Depending on which value seems more threatened at the moment, the non-internationalist majority is drawn into a coalition with those who stress peace or those who stress strength. In practice, presidential leadership and communication are essential ingredients in explaining to the public how the balance is being maintained between firmness and cooperation in the actual implementation of a two-track policy. The best hope to moderate this volatility in attitudes is for a president to elaborate a two-track approach such as the managed balance-of-power strategy.

VII

In sum, while a number of specific measures can be taken to improve the process by which we manage our relations with our principal adversary, there are strict limits to what such changes can achieve. We can alleviate the tendency to oversimplify and exaggerate which tends to amplify the oscillations in our policy. We can improve executive and legislative procedures and try to reduce the incoherence of different parts of our polity speaking with different voices or taking contradictory actions. And we can hope that the tides in our storms of political realignment will eventually ebb sufficiently to allow the return of the centrist orientation, bipartisan

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policy, and cooperation between the branches that reduce the excesses that otherwise grow out of our constitutional structure.

But our political culture and institutions do not change quickly, or easily. The implications of this simple-sounding proposition are very significant. It means that there will always be limits to the types of strategies that we can successfully follow. As stated earlier, our ability to manage the Soviet relationship is less a matter of organization than of choosing an appropriate strategy. The basic principle for a durable strategy is to cut the foreign policy coat to fit our domestic political cloth.

This does not mean appeasing the Soviet Union or failing to balance Soviet power. Quite the contrary. What it means is that if we pick an inappropriately ambitious strategy, we will fail in the long run, because the American domestic political process will produce oscillations and inconsistency. In a nuclear age, we ignore such reality at our peril.

An appropriate strategy must be modest enough to fit our domestic capabilities; it must focus on indirect effects through maintaining our alliances as much as on the direct bilateral relationship with the Soviet Union; and it should combine balancing Soviet power with economic engagement and continual communication. Over time, such a strategy may gradually increase the transparency in the relationship, reducing the dangers of miscalculation and increasing somewhat our understanding of what goes on within the opaque Soviet society. Our strategy should not only manage the current threat of Soviet power, but should gradually seek to improve the conditions that make it so difficult for a society organized such as ours is to manage the relationship with the Soviet Union.

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Donald S. Zagoria

CHINA'S QUIET REVOLUTION

Since Mao Zedong's death in 1976, and particularly since the rise of Deng Xiaoping in 1978, the post-Mao leaders of China have sought to develop a new strategy and new institutions for modernizing China. In the economy, they have sought a more decentralized, quasi-market socialist system better suited to Chinese conditions than the highly centralized, Soviet-type system they adopted in 1949. Perhaps the most significant step has been a de facto decollectivization of agriculture.

There has been a legalization of some private commerce and trade, and some private ownership, particularly in the service industries, together with a greater use of indirect mechanisms such as prices rather than output quotas and commands to influence the allocation of resources. And there has been an upgrading of light industry and the beginning of a striking "consumer revolution."

In the political sphere, the post-Mao leaders seek greater stability and reliability so that China never again has to go through the chaos of a Cultural Revolution. Younger, better educated and more professionally trained officials are slowly replacing the older generation in the Party, government and Army, and top-level Mao loyalists have been removed from power.

An ideological revolution is also under way, with Maoist egalitarianism being replaced by an emphasis on material incentives for hard work, and revolutionary zeal giving way to a pragmatic quest for efficiency and productivity. A dazzling number of new laws have been introduced and China, for the first time since 1949, is beginning to train a large number of lawyers. And there is a substantial new emphasis on developing education, particularly in science and technology; since 1978 tens of thousands of students have been sent to study abroad.

Greater cultural diversity is now tolerated within China; foreign films, plays and books which were once almost completely banned

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are much more readily available. There is a much greater respect for professionalism in China; intellectuals, once relegated to the bottom of Mao's revolutionary society, are being accorded a new prestige and new power.

Accompanying these internal reforms is an opening up of the system to foreign economic and cultural influences on an unprecedented scale—what the Chinese call the "open door" policy. This stands in sharp contrast to two and a half decades of Maoist insularity and "self-sufficiency."

The overall result has been a virtual dismantling of many Maoist institutions and practices and the beginning of a movement toward a more open society. The analogy is striking between China since 1978 and the Soviet Union of the 1920s, under the New Economic Policy (NEP). China today resembles the pre-Stalinist system in the Soviet Union rather than the Stalinist or post-Stalinist one.

Of course, these changes should be seen in context. In a period of only five years, not everything has changed and many aspects of the Maoist-Stalinist system in China remain. The scope of change has varied considerably from region to region within China. And just as the Soviet NEP was eventually replaced by Stalinism, so too the Chinese "NEP" may ultimately give way to a harsher system. Nevertheless, the changes that have occurred are significant and the direction of change, if it is sustained, is very encouraging, both for the welfare of China and for its external relations.

This article seeks first to examine the reasons why these far-reaching changes have come about, then to look at the scope and impact of the reforms and the obstacles to them, to speculate on the future, and, finally, to assess the implications of the reforms for China's relations with the West.

II

The catalyst for the reforms in post-Mao China was an economic and social crisis accompanied by a loss of popular confidence in the ruling Communist Party and its ideology. The catalytic event was, of course, the Cultural Revolution, which ran from about 1966 until shortly after Mao's death.

The situation his successors inherited was nothing short of calamitous. The economy was in serious difficulty. Industrial production was of low quality. Agricultural production was barely keeping abreast of population growth, and per capita food consumption had not improved since the 1950s: one Chinese leader conceded that 100 million Chinese peasants did not have sufficient food to eat. A Communist-controlled periodical in Hong Kong published an even

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bleaker picture in 1979: it said that 200 million peasants—one quarter of the rural population—were living in "a state of semi-starvation." Continual harassment of intellectuals had left behind an antiquated science and technology and an educational system in shambles. The society was embittered, exhausted and alienated.

During the Cultural Revolution, the best judgment is that close to a million people were killed or driven to suicide. Millions of others were sent to labor camps or to work in remote rural areas. By 1979, the very legitimacy of Communist Party rule was in question among large numbers of Chinese. Much of the younger generation was estranged not only from Mao's thoughts, but from Lenin's as well. There was a widespread popular desire among the young to free China from Soviet-style totalitarianism and to move it in a genuinely democratic direction. Respect for the Party and the socialist system was at an all-time low. And one of the most rigid and inefficient bureaucracies on earth seemed incapable of breathing new life into the system.

The picture was desperate enough so that even the Old Guard leaders in China recognized that political survival required drastic action, as a high-ranking official admitted to me on a recent trip to China. Thus the post-Mao leaders embarked on a series of radical reforms designed to raise the abysmally low standard of living, open safety valves for mass dissatisfaction, and gradually restore popular confidence in the ruling Party.

III

At the heart of the post-Mao reforms, under the leadership of Deng Xiaoping, are far-reaching changes in the economic system.[1] By far the most far-reaching has been the de facto decollectivization of agriculture. Since some 80 percent of the Chinese population are peasants, and China remains predominantly rural, this reform clearly affects the largest number of people. Land has not been returned to private ownership; it is still illegal to buy and sell it. But since 1979, most of the countryside has adopted one or another version of the so-called "household responsibility" system, with many individual families or households now assigned parts of the

[1] On the economic reforms, a particularly useful recent treatment is a series of articles under the heading "China Rethinks its Economic System," *The China Business Review*, November-December 1983, especially the essay by Robert F. Dernberger, "The Chinese Search for the Path of Self-Sustained Growth in the 1980s: An Assessment," pp. 19–77. A detailed and objective assessment as of 1982 was done by the Joint Economic Committee of the Congress, *China Under the Four Modernizations*, Washington, D.C.: U.S. Government Printing Office, August 13, 1982, Part 1. On agriculture, the most complete and authoritative recent treatment is Nicholas R. Lardy, *Agriculture in China's Modern Economic Development*, New York: Cambridge University Press, 1983.

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collective fields which they farm on contract with local officials. They are obligated to meet certain state quotas. After meeting these quotas, however, they are free to dispose of the agricultural surplus in any way they see fit, including selling it on the proliferating free markets. In some cases, the contracts signed by individual families are even inheritable.

Most significant of all, the length of contracts between families and the state has recently been extended from 1–3 to 15 years.[2] Many peasants had complained that although the new reforms were welcome, they had no assurance that the Party would not change its mind, as it had done so many times in the past. Deng's reform leadership responded with the 15-year contracts, to give the peasants a greater feeling of security and stability so that they would have incentives to work hard and to invest in the land that is now virtually their own.

Along with the "household responsibility" system, private plots have been greatly expanded. In many areas, these now constitute 15 percent of the total cultivated area of the collective fields, as compared with five to seven percent in the Maoist era. Restrictions on peasant sideline activities have also been substantially eased. For example, most restrictions on private pig-raising have been abolished, and in several provinces there are no restrictions on private raising of sheep and cattle. Within limits, peasants can also now hire laborers.

With these new opportunities has come an expansion of peasant marketing. Rural free markets have been expanded, and since early 1979 private markets for agricultural goods in urban areas have been made legal. Prices in these markets are determined by supply and demand; almost any produce from private plots or sideline activity can be sold in them. On a recent visit to Shanghai, I walked through one of these markets and found it bustling with activity; the stalls displayed a wide variety of fish, meat and vegetables, and the peasants were avidly hawking their wares.

More recently, new banks have been created to generate rural credit so that budding peasant entrepreneurs can invest in new seed, fertilizer and machinery. Another key element in the new agricultural reforms—perhaps the pivotal one—was the first increase in state procurement prices for major farm products in 12 years. One prominent authority on the Chinese economy sums up the new policies in the countryside as representing nothing less than a "fundamental change."[3]

[2] See "Party Document on Rural Work," *Beijing Review*, February 20, 1984, p. 6.
[3] Lardy, *op. cit.*, pp. 88–89.

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Already these incentives are creating a new—albeit small—class of rich peasants in the countryside. In the Chinese press one reads today of individual peasants who earn more than 10,000 yuan a year, an income at least 20 or 30 times the national average. Moreover, the Chinese leaders make no bones about what others might call a "Bukharinite" intention to encourage the peasants to become rich. "After the peasants become rich," Party Secretary General Hu Yaobang recently said, "we must guide them to invest . . . in development projects" in the countryside.[4] And Deng himself has written that it is now ideologically correct "to make some people rich first so as to lead all the people to wealth." It is a Chinese version of trickle-down theory.

This stunning variety of new rural incentives is having a dramatic impact on agricultural efficiency. Agricultural output per capita, according to one American estimate, rose from $166 in 1978 to $226 in 1983, a gain of about 36 percent in five years.[5] Even in 1983, a year of very bad weather, China's decollectivized agriculture continued to grow rapidly; grain production reached 368 million tons, a record and the second in two years. Production of cash crops was also generally good.

An American anthropologist who has been visiting the Chinese countryside in Guangdong province for some years recently wrote:

> When I first visited the Zenbu brigade there in 1979, there was virtually nothing in the market. When I went back in 1981, things had started to pick up. But when I returned this summer [1983] I couldn't believe what I saw. There were hundreds of people selling things. There were tanks of live fish, and piles of fruit and vegetables heaped up everywhere. Loads of pigs were being slaughtered for meat—something you rarely would have seen in the past. You could buy Coca-Cola, Budweiser beer, and foreign cigarettes at private shops. The prosperity was impressive.[6]

Of course, in a Leninist, one-party political system, it is always possible for the Party leaders to reverse policy and go back to the commune system. But such a step would, at a minimum, face serious resistance and have a disastrous impact on productivity, in a country still struggling to keep food production ahead of population growth. Even with the draconian measures to limit population growth that the Chinese leaders are now taking, they will face an increasingly difficult food problem. China has one of the most unfavorable man-

[4] See *The Wall Street Journal*, May 16, 1983, p. 31. It is worth noting that Stephen Cohen's classic work, *Bukharin and the Bolshevik Revolution* (New York: Vintage Books, 1975), has been translated into Chinese.

[5] Wharton Economic Forecasting Associates, as cited in *The China Business Review, loc. cit.*, p. 13.

[6] Cited in Orville Schell, "A Reporter At Large," *The New Yorker*, January 23, 1984, p. 67.

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land ratios of any country in the world; while its population grew by two thirds between 1952 and the late 1970s, the quantity of arable land available per capita actually shrank.[7]

Facing such a serious land constraint, the Chinese leaders will have great incentives to keep on increasing peasant productivity. Thus, even the Old Guard elements in the Chinese leadership would be hard put to make a convincing argument to go back to the old system.

A second important change in China is that the old "Stalinist" priorities—on heavy industry, defense and rapid accumulation—have been replaced by new priorities on light industry, consumer goods, agriculture and raising people's living standards. Since 1978, heavy industry's share of industrial output has fallen, many defense factories have been partly or wholly converted to producing consumer goods, and consumer goods production has expanded rapidly. There is also a rash of new housing being constructed; almost everywhere in Beijing one sees new apartment buildings going up.

In effect, a consumer revolution is under way in China, particularly in the urban areas. The growing Chinese middle class is snapping up television sets and tape recorders that cost a year's salary. They are buying refrigerators and living room suites that would have provoked a scandal just a few years ago. And some are dressing in Western-style trench coats, turtleneck sweaters and track suits.[8] Some 90 percent of the Chinese population now has access to television, and the official *China Daily* says that for every 100 families in Beijing, 55 now have electric fans, 16 have washing machines, 2 have refrigerators and 25 have tape recorders. In 1979 few Beijing families had any of these luxuries.

As part of the consumer revolution, the Chinese authorities are now allowing installment buying and billboard advertising—two "capitalist" techniques for stimulating consumption that would have been unthinkable before. Also now allowed are tourist trips to Hong Kong, where the mainland residents can savor the latest in consumer goods of all types.

Coming as it does after two and a half decades of Maoist austerity, this consumer revolution will not be easy to reverse. China is still a very poor country in terms of individual living standards. Now that the elite has unleashed consumer demand, it will be under great pressure to meet growing expectations of higher living standards.

In a third area, the industrial reforms have not been as sweeping as those in agriculture. There has still been no basic reform of the

[7] Lardy, *op. cit.*, pp. 3–5.
[8] *The Wall Street Journal*, October 26, 1983, p. 1.

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irrational price structure; factories still largely follow orders sent down by the central planners rather than responding to signals in the market place. To most Chinese factory managers, the market remains an abstraction. Still, a number of significant changes are beginning to take place.

Since 1979, enterprises in China have been permitted to retain a certain percentage of their profits for use in any way they see fit, provided they meet certain State guidelines. These excess profits may go into worker bonuses, new technology, new plant, marketing, etc. Another promising experiment is the willingness to let factories sell some of their products directly to the market instead of to the State. "This is beginning to force producers to take a serious look at what the market wants, as opposed to what the planners want," says one expert.[9] One enterprise in Beijing now maintains a marketing staff of nearly 30 individuals (all with technical backgrounds) headed by the plant's former chief engineer.[10]

Perhaps even more significant, the Chinese are now demonstrating a very un-Marxist willingness to close down inefficient enterprises. Normally in Soviet-style centrally planned economies the very thought of laying off workers or closing down enterprises is alien to central planners.[11] To be sure, complete plant shutdown is still used only as a last resort; the preferred solution is to amalgamate inefficient plants into more specialized plants. Still, the discussion in the Chinese press today of how to deal with workers in closed enterprises indicates that plant shutdowns are being carried out; several hundred factories were apparently closed in 1983. And, quite recently, the head of the State Economic Commission made the extraordinary announcement that all subsidies to state enterprises failing to achieve a profit will soon be cut off. Every money-losing state enterprise in China will be given a deadline to start making a profit or risk losing its subsidies.[12]

Another potentially dramatic industrial reform has to do with stimulating greater labor productivity and efficiency. Within the enterprise, the whole system of hiring, firing and promoting workers is being reexamined, with a new un-Maoist emphasis on skills and competence instead of political "purity"—again something that would have been unthinkable a few years ago. The old seniority system is under attack and in its place there is gradually appearing a "meritocratic" system in which workers are rewarded and pro-

[9] See Barry Naughton, "Industrial Management," *The China Business Review, loc. cit.*, pp. 14–18.
[10] See William A. Fischer, "R & D in China," *The China Business Review, loc. cit.*, pp. 30–34.
[11] Dernberger, *loc. cit.*
[12] *The China Business Review, loc. cit.*, p. 4.

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moted for better work; similarly the custom of children automatically inheriting jobs from retiring parents in factories or other institutions is being eroded.

As one observer has put it, "a new consensus seems to have emerged that a total overhaul of the employment system—not mere tinkering—is necessary"—moving away from guaranteed lifetime employment, the so-called "iron rice bowl," toward employment by merit.[13] In one trial system now under way in Beijing, job candidates have to submit to entrance exams, to serve probationary periods, to sign contracts agreeing to certain factory requirements, and to give employers the right to fire them if they are unruly or incompetent. And there is a change of leadership style within the factories. Party cadres assigned there are now instructed to stand aside and not interfere with the day-to-day activities of the production personnel.

A fourth set of reforms has to do with decentralization of much economic decision-making to local authorities. The post-Mao leaders have increased significantly the rates of budget revenue retained by local authorities, and given these local authorities greater freedom to adjust tax rates and even to determine how their retained revenue is to be spent. In 1982, on the average, some 80 percent of local revenues was reported to have been retained by the provinces.[14] Fiscal decentralization has gone so far that the central government now runs a huge budget deficit.

The provinces, special municipalities and special economic zones (to be discussed later) are also now able, within certain limits, to sign contracts with foreign companies without getting Beijing's approval. In most of the provinces, only very large foreign trade ventures now need the center's stamp of approval; in the case of Guangdong, Fujian and the special economic zones, there are no restrictions so long as the provinces do not ask Beijing for financial assistance, raw materials or other assistance.

These decentralizing reforms will be very difficult to reverse now that the provincial authorities have tasted their fruits. In 1981, when Beijing was forced to ask the provinces to lend it seven billion yuan or more to make up its budget deficit, some provinces refused, arguing that they had been promised that the reforms begun in 1980 would remain in force for five years. The central government is reluctant to confiscate provincial budgetary surpluses because if it does so, the provinces may be careful not to show surpluses, thus

[13] Michael Weisskopf, "China Cracks the Iron Rice Bowl," *The Washington Post*, December 31, 1982.

[14] Audrey Donnithorne, "Fiscal Relations," *The China Business Review, loc. cit.*, pp. 25–27.

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defeating the reformers' intentions. Some compromise is now in the works by which the center will get a certain percentage of provincial revenues. But the essence of the reform—to leave the provinces with greater economic decision-making authority—remains intact.

Still another of the new reforms designed to stimulate production has been the substantial expansion of out-and-out private enterprise. Farmers, for example, can now purchase their own trucks and engage in a variety of private enterprises. The Chinese press recently praised one enterprising farmer who bought his own truck and hauled coal from the mines to his collective farm's industry, working 12 hours a day, and earning a great deal of money. Other villagers, after finishing their work in the fields, are producing engine blocks for small tractors, making furniture, forming sewing cooperatives, and generally displaying a good deal of imagination in supplementing their farm incomes.

In the cities and towns, individuals and families can now open tailor shops, restaurants and other private enterprises provided they do not hire more than a certain number of people. Cooks, maids and nannies are now being hired in the households of some middle-income and wealthy professional families.[15] Entrepreneurs are even opening up small private inns for travelers. With the market now playing a much greater—albeit still secondary—role in the working of the economy, there is also now emerging a whole new group of "wheelers and dealers"—what Russians in the 1920s called "Nepmen"—middlemen ready to buy or sell anything for a profit.

At the macroeconomic level, there is growing use of indirect economic levers rather than administrative orders to influence the economy. Thus, a newly created Central Bank now seeks to manipulate the Chinese money supply and fine-tune the economy. Loans, interest rates and even prices are also being used, though still on a modest scale, to guide economic decision-making. Moreover, when the state planners raised prices for major farm products, they did so selectively. Prices for certain crops such as cotton, oil-bearing seed crops and soybeans were increased more than grain prices, partly to achieve desired changes in cropping patterns and partly to cushion basic food prices to the urban population.

This use of price incentives to influence the allocation of resources within the countryside—what the economists call indirect planning—represents an important distinction between the Chinese and the Soviet economic systems. As Nicholas Lardy points out,

[15] Schell, *loc. cit.*, p. 45.

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there has been a great deal more indirect planning in Chinese agriculture since 1978 than in the Soviet Union, where the agricultural system is still characterized by extensive reliance on output targets and even specification of particular farm practices.[16] In this respect, as in many others, the Chinese system today more closely resembles the Soviet system in the 1920s under the New Economic Policy than it resembles the Soviet system today.

IV

In their quest for a more successful modernizing strategy, the post-Mao leaders have opened up their economy and their society to the West in a host of new ways. One is the creation of special economic zones in order to encourage foreign investment in China, to absorb foreign technology and to learn Western techniques. In Shenzhen, a zone adjacent to Hong Kong's New Territories, a once sleepy group of villages is now sprouting modern factories, housing projects and holiday resorts; foreign firms now enjoy special privileges; and thousands of Chinese managers come each year to observe and learn Western techniques. Within the zones, which mainly produce goods for export, foreign-owned enterprises and joint ventures are managed exclusively by foreigners or overseas Chinese and their own boards of directors. The local Chinese governments do not interfere. The foreigners must, of course, abide by Chinese law and they do pay income taxes and property rents. But inside the zones a largely free-market system is being gradually established. Thus the zones are enclaves of capitalism within China, even though the official Chinese press denies this.

China is also luring foreign firms with new profit incentives. About 100 equity joint ventures were formed in 1983, compared with only 83 in the previous four years combined. In the past, foreign companies were justifiably unsure of either China's commitment or legal protection; now at least two dozen foreign investment laws passed in recent years have begun to allay such doubts. The Chinese will continue to have very strong incentives to attract foreign ventures because they are finding that such ventures are the best way to renovate their 400,000 old factories and to keep their technology up to date.

China has also begun a major effort to expand its trade with the United States, Japan and Western Europe. Chinese trade with the United States has gone from $1.1 billion in 1978 to $4.5 billion last year, and the prospects for further growth are good. A Chinese

[16] Lardy, *op. cit.*, p. 41.

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official recently stated that Beijing intends to sign some 1,000 contracts in 1984 to import $1-billion worth of advanced Western technology and equipment.[17]

Perhaps at least as important, the Chinese are sending thousands of research scientists and students abroad for advanced professional training. This is part of a significant renaissance of science and technology which, in turn, is part of an even broader effort to improve the working conditions of Chinese intellectuals. Since 1978, some 18,500 students have been sent to study in 54 countries; thousands of others are studying abroad at their own expense.[18] In the United States alone, there are now more than 10,000 Chinese students. Already, some 7,000 foreign-trained students have returned to China from abroad. Over time, they are almost certain to constitute a group which not only spreads new ideas but has a personal and professional interest in keeping China's door open to the outside world.

Within China, new universities are sprouting all over. There are now more than 50 universities and colleges in Shanghai, compared to about 16 ten years ago. In addition, many economic and political research centers have been established in China and almost all of them maintain close ties with comparable centers in the West. These too are bound to have a strong vested interest in maintaining the "open door" policy.

Even in the cultural realm, the number and variety of books, films, plays and operas now available—including many from foreign countries—is greater than at any time since 1949. There has been a revival of traditional dance and opera and at the same time greater willingness to import Western techniques in music and art—something that was outright heresy during the Cultural Revolution. Much greater religious freedom is now allowed, and Buddhist temples and Christian churches have been reopened in many parts of China.

In sum, since 1978, China has undertaken what amounts to nothing less than a socioeconomic revolution at home and a widespread opening up to the West. The pace of change is rapid, and it is difficult to believe that these developments will not have an impact for many years, and perhaps decades, to come.

[17] *The New York Times*, January 29, 1984, p. 1.

[18] It is worth noting that in the 11 years of the Sino-Soviet Alliance, from 1950 to 1961, only some 8,000 Chinese students studied in Moscow. Almost none went elsewhere.

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V

There have been a series of substantial changes in the political and ideological spheres as well. At the very top of the leadership, Hua Guofeng and other key opponents of economic reform have been removed from the top decision-making bodies; they have been replaced by strong reform advocates such as Premier Zhao Ziyang and Party Secretary Hu Yaobang.

In the middle and lower ranks of the Party, where Deng's reform coalition has run into substantial resistance, a whole new generation of relatively young "experts" is gradually taking over and replacing the poorly educated cadres promoted during the Cultural Revolution. A careful study of the 12th Party Congress held in September 1982 concluded that "the transition to the post-revolutionary generation seems to be well on its way" and that the cadres promoted during the Cultural Revolution "are very much on the defensive."[19]

Government, too, is being trimmed and made more professional. Some 40 percent of the National People's Congress, the highest legislative organ, are now engineers and technicians. Of the ministers under the State Council, only two or three held the same job before the decisive third plenum in 1978 which marked Deng's comeback. The new ministers are generally better educated and more professionally competent than the older ones. Local government officials are also being replaced by younger and better educated cadres: during my December 1983 visit to China, American consular representatives in Shanghai reported a notable improvement in the caliber of the younger people now managing that city's affairs.

In the vast countryside, the old communes and the three-tiered system of commune, brigade and production team have virtually ceased to exist as a result of the devolution of economic decision-making to the family. The commune's administrative and political functions have been taken over by the township government—which means that millions of Party cadres at the commune and brigade level no longer have any real administrative responsibility.

In the People's Liberation Army, too, some of the older officers are being retired and replaced by younger, more professional officers; political work is being subordinated to military objectives

[19] On the political changes, two particularly good sources are William deB. Mills, "Generational Change in China," *Problems of Communism*, November-December 1983, pp. 16–35, and Kenneth Lieberthal, "Reform Politics," *The China Business Review, loc. cit.* footnote 1, pp. 10–12. For a skeptical view of China's political situation, stressing particularly the continued strength of the Old Guard, see Chalmers Johnson, "East Asia: Another Year of Living Dangerously," *Foreign Affairs*, America and the World 1983, pp. 731–38.

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and the role of the political commissars is being downgraded. There has been a sweeping change of regional and district commanders, and the new commanders all have professional rather than political backgrounds. Deng himself has taken over the crucial post of chairman of the Party's Military Control Commission; he has apparently been successful in placing the Army under the firm leadership of the Party and neutralizing anti-reform opposition which still emanates from some Mao loyalists.[20]

In sum, in the Party, government and Army, there has begun what one China specialist in the U.S. Embassy in Beijing described as the beginning of a "sea change" in the Chinese leadership. The old, semi-educated peasant revolutionaries who went through the Long March and were Mao's most trusted cadres for two and a half decades are giving way to a new generation of younger, better educated, more technically competent leaders. The attitudes and perspectives of the new generation are bound to be quite different from the generation of leaders they have succeeded. Their primary goal will be modernization and development. And they are bound to be more sophisticated and cosmopolitan in their techniques.

In the critical realm of ideology, the post-Mao leaders now strongly denounce Maoist egalitarianism. In the words of an official Chinese publication, "experience proves that egalitarianism is a disaster to the socialist cause, a throttle on enthusiasm for labor and a corrosive agent to the social productive forces."[21]

Even the Maoist emphasis on "class struggle" has been ended. Class labels such as "landlord," "rightist," or "reactionary" are being removed from millions of Chinese and the government has promised to restore these people or their survivors to their previous positions. This implies a halt to the internal turmoil produced by Mao's endless search for class "enemies."

While still insisting on the four unchallengeable principles—Marxism-Leninism-Mao Zedong Thought, the dictatorship of the proletariat, pursuit of socialism, and leadership by the Chinese Communist Party (CCP)—China's new leaders are interpreting this ideology in a much more pragmatic fashion than was the case during the reign of Mao. Deng consistently emphasizes the need to "seek truth from facts," to use "practice" as the sole criterion for truth, and to emancipate the mind from dogma. And the able

[20] Ellis Joffe, "Party and Military in China: Professionalism in Command?" *Problems of Communism*, September-October 1983, pp. 48–63.

[21] Yan Ling, "The Necessity, Possibility and Realization of Socialist Transformation of China's Agriculture," *Social Science in China*, Vol. III, no. 1, p. 116. (This is published by the Chinese Academy of Social Sciences, with which the author is associated.)

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technocratic prime minister, Zhao Ziyang, has warned that the Chinese must not "bind ourselves as silkworms do in cocoons."

Another important ideological reform is the change in the "faster the better" approach of the Maoists. The pronouncements of all the post-Mao leaders are marked by a sober realism that was unfashionable in the days of the Chairman. Party Secretary General Hu Yaobang characteristically acknowledges that China's economy and culture still lag far behind the most advanced nations and that it could take 50 or more years before China can even approach these nations. Deng warns that the "theory of speeding up" and of setting targets too high was one of the worst mistakes of the Maoist era and led to such disasters as The Great Leap Forward. Indeed, it is common now for Chinese leaders to concede that China missed its capitalist stage of development and that its earlier efforts to plunge directly from "feudalism" into socialism were mistaken. The clear implication is that China must now undergo a slow and historic quasi-capitalist transformation, under the guidance of the Chinese Communist Party, before it can be ready for socialism.

Post-Mao China is also undergoing a legal revolution. Since 1979, an extraordinary number of new laws have appeared; even Western legal specialists have a hard time keeping up with them. A dozen legal journals are now being published and the number of lawyers is growing. Some 1,800 law students are already studying in Beijing University's Law School and more than 20 Chinese law professors are studying in the United States. Prime Minister Zhao has recently called on officials to supervise economic activities by legal means rather than by administrative fiat. The leaders of the People's Republic have denounced the terror unleashed during the Cultural Revolution and begun to lay the bases for a stable legal system.

Of course, the impact of all of these political changes should not be exaggerated. There are no free elections at any level of the political system. Civil liberties in the Western sense are not recognized. Political indoctrination is still a major element of education at all levels. The media are controlled, though more loosely than before. Birth control measures are extraordinarily strict, including forced abortion. The major instruments of totalitarian rule, while weakened, have not been eliminated. Labor camps for political prisoners still exist, and many of the "democratic activists" who were encouraged to dissident action by the loosening of controls in 1978–79 have been jailed. Recently there were showcase executions of substantial numbers accused of various crimes. A conservative Old Guard remains entrenched within the ruling Party and it is fearful that the reform effort may weaken Party control. The

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experience of Eastern Europe and the Soviet Union cautions that genuine and lasting reform of Leninist systems is extremely difficult because any real relaxation of decision-making authority challenges the vested interests of the ruling Party.

Still, the changes now in progress in China are very great, they have strong popular support, and they go further than many Western observers realize. As Christopher Wren has written: "In four years, Mr. Deng has brought China around to virtually a mixed market economy and opened its doors to Western investment. One official likened his country to a great ship in a storm. It was trying to change course, he said, but it could not do so all at once or the ship might capsize."[22]

VI

Might this happen? While the pace of reform has been impressive, substantial obstacles remain.

First among these is the resistance of much of the bureaucracy. The impetus for the reforms comes largely from the very top leadership. Yet it is the middle and lower levels of the bureaucracy that are responsible for carrying them out.

By decentralizing power and turning it over to professionals and experts, by virtually decollectivizing agriculture, by purging the Party, and by opening up other avenues of reward such as wealth, Deng's reforms threaten the power and prestige of the traditional Party apparatchiks. Much of the resistance within the Party undoubtedly comes from some 15 million of its 40 million members—those who were recruited during the Cultural Revolution in a totally different atmosphere from that prevailing today. They came into the Party as "revolutionary purists," not as overseers of technocratic reform.

There are many indications of bureaucratic resistance. Liu Shaoqi's 1962 essay on Party life has been widely republished and publicized. Much of it warns against lower level Party officials who "don't respect or implement the decisions of the Party's Central Committee" and who "go against the Party Central Committee's policies." When the October 1983 plenum of the Central Committee decided to go ahead with a purge of the Party, it was conceded in the official documents that many Party members resist the new policies and that others feign compliance while covertly opposing

[22] Quoted in Wren, "Given a Choice, Chinese Prefer Cabbage to Ideology," *The New York Times*, September 20, 1982, p. 2.

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the Party line. Others openly refuse to carry them out.[23] How successful that purge has been cannot yet be judged.

A key problem is what happens after the 79-year-old Deng Xiaoping passes from the scene. It is unlikely that either the prime minister, Zhao Ziyang, or the Party secretary, Hu Yaobang, can command the confidence of the Army in the manner that Deng has been able to. Among the higher ranks of the armed forces there must be a heavy industry and defense lobby that will not indefinitely tolerate a consumer revolution that pushes defense to the bottom of the nation's priority list.

If Deng were to die in the near future, it is conceivable that a power struggle might develop, thus introducing a new note of instability into the picture. Already there are noticeable differences in emphasis in the speeches of Party and government leaders. One perceptive observer noted that Hu's speech at the 12th Congress of the CCP in September 1982 was a reassertion of "China's orthodox commitment to promoting communist morality and eventually achieving communist goals at home and abroad," whereas Zhao's speeches typically called for the "pragmatic development of good relations with all countries for the sake of diversifying economic ties."[24] It could be an important factor in Hu's favor that he is one of the few remaining members of the still-prestigious Long March generation.

In a post-Deng succession struggle, there could figure not only Hu and Zhao and the heavy industry/defense lobby, but some of the Old Guard veterans in the Party who yearn for a more streamlined but still highly centralized system. What would be the attitude of the Old Guard in this post-Deng struggle? Would it throw its weight behind the reformers or would it try to put a brake on the reforms or even to reverse some of them? No one can be certain of the answer.

For such reasons, it is possible to understand Milton Friedman's pessimism after a recent visit to China:

> I am pessimistic that the progress will be long continued. Opening up the system involves dispersing power and responsibility and that will produce threats to the security of the centralized political apparatus. It is likely to respond by closing down again.[25]

[23] Amanda Bennett, "China Party Plans Drive to Purge 'Unfit' Members," *The Asian Wall Street Journal*, October 17, 1983.
[24] Carol Hamrin, "China Reassesses the Superpowers," *Pacific Affairs*, Summer 1983, p. 228.
[25] Cited by Dernberger, *loc. cit.*

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Such pessimism could be reinforced by any observer of reform efforts in other communist systems.[26]

Much then depends on whether Deng Xiaoping holds on. If—and it is obviously a big if—he remains in effective control for another few years, the reform process is likely to be more institutionalized than it is now and therefore more difficult to reverse. By then, too, Deng's self-appointed successors, Zhao Ziyang and Hu Yaobang, should have been able to consolidate their power, especially given Hu's significant grip on the Party's levers of power. Hu is busy moving younger men into positions of authority in the Party. (One of the rising stars is Hu Qili, an articulate protege of Hu and the head of the Central Committee's powerful General Affairs Department.)

On the other hand, if Deng were to die or fail physically in the immediate future, a struggle over the present ideological direction and for power could well erupt, and the fate of the reformers would be much more uncertain.

VII

Apart from the leadership situation, there are other reasons to be cautious about the future. First, while the changes so far constitute a thoroughgoing de-Maoization of the system, it is still not clear how far the reform coalition intends to depart from the orthodox Soviet economic model. The true tests lie ahead. Will the Chinese move further in the direction of trying to create a market socialist economy of the Hungarian or Yugoslav variety, or will they tightly restrict the market forces they are beginning to unleash? There is still no coherent strategy for combining Plan and market and the problems of running a mixed system are bound to be enormous.

Indeed, the present situation is unstable. China's economic system is just beginning to experiment with market forces. At some point a decision will have to be made whether to go forward or backward. To go forward on this road, it will be necessary to have a real price reform so that prices are a true indication of market value. One almost inevitable step would be the removal of many of the subsidies that now protect urban workers from higher prices for relatively scarce commodities. This in itself could have serious consequences,

[26] A recent conference in Milan of experts on the Eastern Bloc reached the conclusion that most attempts at reform in Eastern Europe over the past two decades had failed, except in Hungary. An important factor was the Party's fear of the political cost of economic and social reform. See Keven Devlin, "Are the East Bloc Regimes Reformable? Italian Leftists Ask," New York: Radio Free Europe Research Report, November 11, 1983.

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along with added unemployment stemming from the closing of enterprises now preserved by the arbitrary price structure. Price reform is also bound to lead to inflation—in a country where the old generation still remembers the wild inflation of 1948 which contributed to the downfall of Chiang Kai-shek.

The new reforms are bringing with them a host of serious social problems. In the countryside, the agricultural decollectivization risks polarizing a new class of richer peasants and the great majority of poor peasants. Already there are reports of rural gangs stealing the crops of richer peasants before they are fully ripe, so that they can be sold on the free market. There could also be growing unemployment in the countryside. More than a hundred million of China's 800 million peasants are considered by many experts to be surplus laborers who were, in fact, subsidized by the old "iron rice bowl" of the commune system. Many of these poor peasants, now without sufficient productive assets to exploit the new opportunities, could flock to the cities and become a source of serious political unrest. Such migration is already visible and the government has had to enforce ever stricter regulations to arrest it.

Regional tensions may likewise grow. The provinces and regions most likely to benefit from decentralizing reforms will be pitted against those least likely to benefit. The latter will call for more centralization or other forms of support. These interregional disputes will inevitably be translated into competing priorities at the higher levels of the Party.

The Party's stringent efforts to limit families to only one child are also likely to fuel discontent, particularly in the countryside where more children traditionally mean more work hands and more income.

Tensions are also growing between some of the more affluent rural areas adjacent to urban centers and nearby urban workers and intellectuals who feel they are not keeping up with recent increases in peasant income. Rich peasants are, for example, now coming to Shanghai as tourists and arousing the resentment of urban workers who have yet to benefit as much from the reforms.

Economic progress has been highly uneven: in particular, the industrial reforms have been much more disappointing than those in agriculture. With a few notable exceptions, labor productivity has yet to show much improvement. Indeed, it actually declined in 10 of 15 industries in 1981.[27]

There are many reasons for this. Efforts to tie pay to performance

[27] Andrew Walder, "Rice Bowl Reforms," *The China Business Review, loc. cit.*, pp. 18–21.

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have been vigorously resisted by Chinese workers who for years have been accustomed to a relaxed pace of work. All work standards were abolished during the Cultural Revolution, and the prolonged austerity of the Maoist years took a terrible toll on workers' motivation. Managers do not want to antagonize workers and so distribute bonuses more or less evenly regardless of individual output.

If labor productivity within the enterprise has not shown much improvement, neither has enterprise efficiency. Large numbers of state enterprises continue to lose money and the Chinese media increasingly voice their concern over such losing enterprises. According to one recent article in the Chinese press, enterprises engaged in handling meat, eggs and vegetables throughout the country lost 1.1 billion yuan in the first half of 1983.[28] According to another, the number of enterprises suffering losses in 1983 increased by 200 in a single province.[29]

A basic reason, to repeat, is the irrational price structure. Because prices in China do not reflect supply and demand, but are set arbitrarily by the State, profits in industry result more from accidents of the pricing system than from good or bad business practices.[30]

Accordingly, some Chinese economists are now calling for more thorough reform of the price structure, and modest steps in this direction have already been taken. But the official line on this point remains very cautious: "At present a high level of concentration of the power of price administration is necessary to ensure basic balance in finance and credit. And basic stability of commodity prices is necessary in order to overcome the temporary difficult situation in finances and the economy. But when the situation basically changes for the better, when the hidden danger is eliminated, power should be appropriately decentralized."[31]

In sum, there are many uncertainties about the future of reform—ranging from the unpredictability of the leadership situation after Deng, to the powerful new social tensions that are being generated by the reforms, to the vested interests in China that are harmed by reform.

[28] *Beijing Renmin Ribao* (People's Daily), in Foreign Broadcast Information Service, *Daily Report, China*, November 23, 1983, p. K 11.

[29] *Fujian Ribao*, FBIS, *Daily Report, China*, November 1, 1983, p. O 3.

[30] Steven B. Butler, "China Needs Broad Price Reforms," *The Asian Wall Street Journal*, December 19, 1983, p. 10.

[31] Cheng Yao, "An Inquiry into the Reform of the Price System," *People's Daily*, in FBIS, *Daily Report, China*, November 10, 1983, p. K 18.

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VIII

Despite these uncertainties, I believe that it is possible to be cautiously optimistic about the future of reform.[32] First, as Barry Naughton has put the case:

> What is most significant is that the reform movement has been sustained for five years, and the response of the regime to succeeding waves of new problems has not been to abandon the reform process. Instead, important new roles for market forces have been found, a major financial decentralization has occurred, and steps towards a more appropriate price system have been taken. If the Chinese are able to build upon these achievements and accelerate the pace of reform, we may begin to see fundamental changes in the behavior of China's managers and workers.[33]

Second, the post-Mao leaders introduced such drastic reforms not so much because they were ideologically committed to reform as such, as because the system was an economic failure and they wanted to restore popular faith in the Communist Party's ability to modernize China. The whole reform process must be regarded as a response to a perceived crisis of stagnation which, sooner or later, would have undermined the very basis of Communist power.

The conditions which gave rise to the need for reform in China will not quickly disappear. With a per capita income of $250 per year, China remains one of the poorest countries in the world. At the same time, the Chinese people have access to mass communications and are therefore increasingly aware of the much higher living standards outside China—especially in Hong Kong, Taiwan and Southeast Asia, where millions of overseas Chinese live. Unless this growing "political awakening" on the mainland is accompanied by sustained material progress during the coming decade or more, the consequences for the Party could be ominous. Time and again, when I asked Chinese officials on my recent trip just what would prevent a sharp reversal of the reforms, they responded that the population itself would not tolerate it.

Another reason for cautious optimism is the mounting evidence that the present leadership in China is committed to making the reforms irreversible. Perhaps the best recent indication of this is the lengthening to 15 years of the peasants' contracts under the responsibility system. This long-term commitment to de facto de-

[32] There are some writers who are optimistic about China no matter what course China takes. I was not among those who were optimistic about Maoist China, as is indicated by an article I wrote nearly 10 years ago, "China By Daylight," *Dissent*, Spring 1975.

[33] Naughton, *loc. cit.*

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collectivization will be especially difficult for any future leadership to reverse.

This and other reforms have already developed a momentum of their own, so that they could not be undone without risking major instability. The reform process itself has already created many vested interests of its own, from peasants to provincial Party leaders to reform economists.

Moreover, the cost of pulling back grows with every passing year. A good example of the difficulties of retreat is the recent fate of the "spiritual pollution" campaign, designed to check corrupting foreign influences. Quite possibly that campaign was designed to appeal to leftover Cultural Revolution adherents and old-line conservatives—even as the Party purge got under way directed against just such elements. But, after inaugurating this campaign in October 1983, the leadership was soon forced to keep it out of the countryside, then to issue rules confining the campaign to certain abuses such as pornography, and finally, to eliminate it. The quick demise of the "spiritual pollution" campaign was probably forced on the elite by the fear that if it was not brought under control it would interfere with economic development. In the Maoist era, or even a few years ago, such a campaign could have been continued indefinitely. But in an era where the leaders are committed to raising living standards and improving the economy, such campaigns soon turn out to be counterproductive.

Then, too, it is difficult to imagine the circumstances which might precipitate a wholesale reversal of the reforms. Certainly a threat to Party power would lead to such a radical reversal. But the Party quickly stamped out the activists who wanted a genuine democratization of the political system in 1979–80; it is unlikely that dissidents will be able to mount an effective challenge to Party rule in China at any time in the foreseeable future.

Still another reason for cautious optimism is that the reforms are producing results and seem likely to lead to further economic growth. Vice Premier Yao Yi Lin recently announced that the economic situation in 1983 was the best since 1978. If the reforms continue to be accompanied by substantial and sustained growth, it will be very difficult for reform opponents to quarrel with success.

It is also possible to exaggerate the degree of resistance to the reform effort from the Party. The Party itself is not a monolithic entity. At the top, there are many people committed to the reform effort. Even among the so-called Old Guard, there are probably many leaders who want reform so long as it strengthens the economy and does not drastically weaken Party rule. Some of the

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provincial Party leaders from richer provinces must favor the reforms. So too must some of the enormous numbers of Party cadres in the rural areas, many of whom will now be able to become relatively wealthy farmers. Indeed, they are in an excellent position to become affluent simply by cooperating with, and guiding, the reform effort.

Within the Army, too, there is a group that is evidently committed to Deng's idea that the Army cannot be modernized until the economy itself is modernized and that this must therefore take first priority. Some Army leaders are therefore in favor of developing a Chinese electronics industry, and of developing exports in order to pay for imported foreign technology.

One day, too, the Chinese will reap the huge benefits to be extracted from their impressive oil and coal reserves. The oil and gas prospects on China's continental shelf are very promising and a number of foreign oil companies, including several American companies, are now exploring these reserves. Although some of the hopes and guesstimates of a few years back have turned out to be exaggerated, six large basins with oil and gas deposits have already been discovered and foreign petroleum experts now estimate that China's oil reserves total 30 to 100 billion tons.

China is rich in coal reserves. The construction of new mines, also with foreign assistance, is now at the level where coal production could soon reach more than 700 million tons per year and thereby outstrip the annual coal production both of the United States and of the Soviet Union. The Chinese intend to use coal as their main domestic energy source while exporting most of the petroleum in order to finance future imports and technology.

The Chinese will also profit from strong foreign exchange reserves and a super-cautious borrowing policy. Unlike many less-developed countries which are heavily in debt to foreign banks, the Chinese have lined up some $13 billion in commercial credits over the past few years but have used less than ten percent of this total. Thus, in the future, China will be an excellent candidate for loans from foreign banks and world financial organizations at medium or low interest rates. This is why China joined both the International Monetary Fund and the World Bank several years ago.

The present international context is also conducive to reform in China. The Chinese have begun to reduce tensions with the Soviet Union and there is every reason to believe that this limited détente with Moscow will continue through the 1980s, even if it is unlikely

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to lead to a fundamental rapprochement.[34] A large-scale renewal of fighting with Vietnam is unlikely. And China's relations with the West in general are now better than they have been for three decades.

In their efforts at reform, moreover, the Chinese will be able to learn from, and interact with, what one observer calls a number of "external reference economies"—which, it should be noted, are not culturally threatening to China in the same way that Western Europe was, and is, culturally threatening to the Russians.[35] The Chinese will be able to benefit from the development experience of Japan, Taiwan, Hong Kong and the other Pacific "success stories." And, increasingly, China can turn to a large overseas Chinese community with modern skills and capital that can be made available to assist mainland development. Already some 80 or 90 percent of the investment in the special economic zones comes from overseas Chinese.

By contrast, there is no deep loyalty to the orthodox Soviet economic model. It has been undermined by the heritage of Russian imperialism against China and the progressive discrediting of Leninism as an economic development strategy.

An accurate reading of Chinese history during the past century and a half might also lead to optimism. The key Chinese concern, as John Fairbank noted over a generation ago, has been a search for the proper route to a Chinese modernity in response to the Western challenge and to powerful indigenous forces demanding change.

One group of China specialists has identified four camps in this century-old struggle: the militant fundamentalists who seek strict isolation from alien influences; the radical conservatives who seek to preserve the essence of China but with selective borrowing of Western technology; the eclectic modernizers who are somewhat more tolerant of a Western presence in China; and the Westernized Chinese who seek to pursue national greatness by seeking alliance with, and dependency upon, a Western country that is to be emulated.[36]

As of the mid-1980s, the militant fundamentalists as represented by Mao and the Cultural Revolutionaries have been thoroughly discredited. The strategy of emulating either the United States or

[34] Donald S. Zagoria, "The Moscow-Beijing Détente," *Foreign Affairs*, Spring 1983, pp. 853–873.
[35] Chalmers Johnson, "What's Wrong with Chinese Political Studies?," *Asian Survey*, October 1982, pp. 919–933.
[36] Michel Oksenberg and Steven Goldstein, "The Chinese Political Spectrum," *Problems of Communism*, March-April 1974, pp. 1–13.

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the Soviet Union, or of allying with either, likewise seems to have been conclusively rejected. It is therefore likely that the future belongs to some balance between "radical conservatives" and "eclectic modernizers," groups that differ in degree but are broadly prepared to accept a certain degree of liberalization and a significant Western presence in China, while seeking a path of modernization compatible with Chinese values.

In expressing cautious optimism about the future of reform in China, I do not mean to suggest that there will be a straight path ahead toward greater liberalization. On the contrary, there has been some recentralization of economic decision-making in the past year or two and the future path of reform is more likely to be checkered than consistent. There is, after all, no magic formula which can, in the short space of five years, cure an economic organism ruined by several decades of Maoist totalitarianism.

Nor is it realistic to believe that a largely peasant country with a long semi-feudal, hierarchic, bureaucratic and Leninist tradition is going to blossom into a more open society without a great deal of resistance. My expression of cautious optimism simply means that I do not believe that the reforms adopted so far are likely to be reversed. What is more problematic is whether the reforms will be steadily expanded over the long haul.

There is, however, no realistic alternative to some reform and to keeping the door open to the West, so that China can benefit from infusions of Western technology. Any other course of action—a return to Maoism self-sufficiency or an increase in greater repression of a "Stalinist" variety—would almost certainly have a disastrous impact on economic productivity.

The post-Mao Chinese leaders are therefore likely to continue cautiously on the path of reform in an effort to achieve economic modernization, while trying in a variety of ways to limit the unwanted political and social side effects of reform.

IX

Finally, what is the significance of the Chinese reform effort for the West?

Of course, the West should not delude itself about the likely consequences of these reforms. A modernizing China under a Communist Party—no matter how far it goes down the path of reform—will be independent in world affairs and not a Western ally; it will remain highly authoritarian; and its interests and values will conflict with those of the West in many areas.

Still, the present trends in China are very hopeful. What has

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happened in China during the past five years would have been considered unimaginable if it had been predicted a decade ago when China was in the throes of the Cultural Revolution. Already the post-Mao leaders have demonstrated in five years a much greater flexibility in tampering with their Leninist system than the post-Stalin leaders in the Soviet Union have shown in three decades.

China is now in the process of becoming a more open society. Decentralizing, quasi-market reforms, if they continue, are bound to produce a more liberal political and social climate in China, as they have already done in Hungary, the most liberal of all the East European Communist bloc nations. Such reforms inevitably alter the balance between state and society in favor of the latter. The intellectual and legal revolutions, as well as the "open door" policy, will also stimulate a more liberal trend within China.

A China committed to reform will also continue to be a China with a strong interest in peace and stability abroad—because a reforming China needs a peaceful and stable international climate. Such a China is also more likely to be less xenophobic and therefore more pragmatic on some of the currently most sensitive national issues such as the future of Taiwan and of Hong Kong.

A reformist China will also want to continue its "open door" policy and to develop substantial new trade and cultural ties with the West. Such a China will want also to be increasingly drawn into the new Pacific Community that is emerging in the Far East. All of these developments will increase China's incentives for a long-term relationship with the West and diminish the incentives for any fundamental rapprochement with the Soviet Union.

The West now has a unique opportunity to try to inject ideas into the continuing Chinese dialogue on what is the proper model for China to follow. During the past decade, the deep ideological—as well as economic and political—crisis in China has affected the elite, the bureaucracy and the whole population. As a result, China is looking abroad for new ideas and models to a much greater extent than ever before in recent Chinese history. Many East European reform economists have been invited to China to discuss Eastern Europe's experience with quasi-market, socialist systems. A number of Western economists have participated in a variety of discussions with their Chinese colleagues. The Chinese are eagerly studying Western management techniques. And Party Secretary Hu Yaobang is reported to have read widely about the Meiji reforms in Japan during the middle of the nineteenth century.

Finally, if the Chinese reforms do prove to be successful over a longer period of time, they could have a significant impact on some

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future generation of Soviet leaders. This is more likely to be the case if reformist China and reformist Hungary develop more rapidly than the more orthodox Soviet and East European communist systems.

For all of these reasons, therefore, it is in the West's interest to help China along its present path of modernization.

It is also important for the West to view what is now happening in China in historical perspective. When Premier Zhao Ziyang recently arrived in the United States for conversations with President Reagan, a number of commentators observed that this Chinese Communist leader was cut from a different cloth than many of the Chinese leaders with whom Americans had been familiar in the past. Zhao was the consummate technocrat, a capable administrator, a man with a graceful style and enough worldliness to shed the gray Mao uniform for a Western coat and tie.

What went unremarked was what Zhao symbolizes. China is still in the throes of a historic transition that first began in the middle of the nineteenth century when it was shaken by the incursions of Western imperialism. The early Republican, the Kuomintang and the Maoist effort to modernize China all failed. China is now setting out on a new course. For the first time since 1949, the revolutionaries are being replaced by the modernizers. And to modernize, China now requires a long period of external peace and internal stability.

For the West, one key to good long-term relations with China can be found in a common strategic interest in opposing Soviet expansion. But, in addition to this strong negative bond between China and the West, there is now opening up an equally strong positive bond—a liberal trend within China and China's need for much greater Western participation in its modernization program. This was the principal message delivered by Zhao Ziyang when he visited the United States in January. A positive U.S. response to this hope should be in the message that President Reagan carries with him to China in April.

Taken together, these two bonds between China and the West—one negative, the other positive—offer the hope of building a partnership strong enough to absorb the basic differences over Taiwan. Properly nurtured on both sides, it could carry into the twenty-first century, when China is almost certain to take its place among the major world powers.

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Larry Diamond

NIGERIA IN SEARCH OF DEMOCRACY

> We are intoxicated with politics. The premium on political power is so high that we are prone to take the most extreme measures in order to win and maintain political power, our energy tends to be channelled into the struggle for power to the detriment of economically productive effort, and we habitually seek political solutions to virtually every problem. Such are the manifestations of the overpoliticization of social life in Nigeria.
>
> —Professor Claude Ake

Once again, Nigeria is governed by the military. For the second time since Independence in 1960, a democratic constitution that was not working has been overthrown in a military coup. Like the first coup 18 years earlier, the action of the soldiers last December 31 has met with broad popular support. Yet it has been a stunning blow to those who had hoped to see democratic institutions prosper in this largest and most potentially powerful African nation, as a model for other African states.

Many early reactions in the West have portrayed the coupmakers as a bunch of power-hungry soldiers, with no appreciation for democracy, eager to dip their hands into the nation's coffers. This is a gross misreading of the coup. The new military government may, in the end, fail the expectations of the Nigerian people as badly as previous governments have, but it has swept into power on a deep tide of disillusionment and disgust with civilian politics. Its primary purpose appears overwhelmingly to have been national salvation, not personal aggrandizement. Its motivating spirit has been popular and redemptive, not authoritarian.

II

What caused the coup was not the ambitions of the soldiers but the decay of the country under four and a quarter years of civilian rule. This decay had three components: staggering corruption, crippling economic waste and mismanagement, and the vitiating of the electoral process through violence and fraud.

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It is another misconception to argue, as many Western newspapers have, that corruption under the late Second Republic was no worse than it had been under previous regimes, and hence was only an excuse for the coup. In fact, corruption in Nigeria has grown more widespread and brazen with each regime, and was more out of control than ever under the last one. To some extent it is true that the civilians only applied more intensively and perfectly devices that had long been in operation, in particular the pervasive inflation of contracts to cover the costs of kickbacks to ministers and parties and of commissions to politically connected agents. The almost universal padding of these contracts by 50 to 100 percent meant that only half as many projects could be undertaken. And the payment of huge "mobilization fees" before the performance of any substantial work meant that many were never completed. The shells of unfinished hospitals and public housing, the treacherous craters of ungraded roads, the idle cranes and pumps and bulldozers, stood in virtually every state as vivid testimony to what was happening.

Continually, the newspapers published exposes of fantastic corruption, something much more than business as usual. In 1983 alone, these included the alleged mysterious exhaustion by June of the $2.5-billion annual allocation for import licenses, a press report from London of fraudulent import-export transactions exceeding $6 billion, and the arrest of several top officials of the Federal Capital Development Authority in Abuja over an alleged $20-million fraud in its accounts. One scandal followed another: the disappearance of millions of naira (one naira currently equals approximately $1.35) worth of building materials from the warehouse of the Nigeria National Supply Company; the acceptance of large bribes by legislators deliberating on the renewal of a monopoly contract to a Swiss firm; the rumored apprehension at customs in London of a Nigerian Governor trying to smuggle several million naira cash into Britain; the revelation by a Federal Minister that Nigeria was losing 50 million naira a month to ghost workers and other forms of payroll fraud. None of these charges was ever proven or punished in court, but this failure only deepened the sense that things were out of control.

Theft of public resources was not only rampant but destructive. Mysterious fires razed important government buildings that had become enmeshed in scandal, including the Ministry of External Affairs and the Development Authority in Abuja. In January of last year, fire broke out at the 37-story headquarters of the Nigerian External Telecommunications in Lagos. The building was the pride

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of Nigerian architecture and the fire, described by the government-owned *New Nigerian* as "a calculated act, planned and executed to cover up corruption and embezzlement in the company,"[1] visibly quickened the pace of political decay. To both ordinary Nigerians and the country's intelligentsia—students, intellectuals, professionals, and military officers—it symbolized the rapaciousness of the ruling elite. Students quickly took to the streets in Lagos and several state capitals, chanting and carrying signs calling for the return of the military.

Even if the scale of corruption was no greater than before, it was more visible. In part this was because it was more brazen. But also, to the credit of Nigeria's rapidly maturing independent press, it was also more frequently and vigorously exposed. In addition, government was much larger and more complicated under a democratic construction. Cabinets had to be enlarged to accommodate all the allies and interests behind a governor or president. There were six political parties, spending at a furious pace, that had to be financed, and were dutifully supported with a percentage of every contract. And there were state and federal legislators—almost two thousand of them—who had not only voted themselves (in a lengthy preoccupation at the start of their terms) generous salaries and benefits and accommodations and staffs, but who were known to be receiving and exchanging huge sums of cash for their votes. For these reasons, democracy was even more expensive than it appeared, and the burden was on the politicians to show that it was worth the price.

What the people got was not performance but arrogance, displays of wealth that were stupidly insensitive to the economic realities of recession, scarcity and suffering. Naira were sprayed around at social functions and donated to political causes by ministers and legislators in amounts that exceeded and often dwarfed their legitimate annual incomes. Draped in gold and magnificent dress, they assumed the bearing of aristocracy, and became considerably more distant from the people than much of Nigeria's traditional royalty.

All of this fed the disillusionment, the steady and perceptible erosion of the legitimacy of the Second Republic. Well before the elections last summer, a national consensus was emerging that greed was destroying democracy in Nigeria. It was expressed in a thousand different ways and contexts. In a trenchant editorial on the eve of last summer's elections, the privately owned *National Concord* (the country's most widely read newspaper) bitterly declared that the

[1] *New Nigerian* (Kaduna), January 25, 1983.

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view of "politics as a means of self-enrichment" had brought "a cynical practice of democracy; government by the rich, for the rich and in the name of the people."[2] One month later, a Lagos magistrate, exposing an accused person who had promised him two plots of land in exchange for acquittal, warned that corruption had "ruined democracy in Nigeria" and was threatening to destroy the society.[3] Such warnings and lamentations began early in the new civilian government, with the looting and the self-absorption of the politicians.

Precisely how much government revenue was embezzled or misappropriated during civilian rule will never be known, but the amount is believed to have been in the billions. If the former minister's estimate of payroll fraud is even broadly accurate, several billion dollars were lost by this one device. Leading figures in Nigerian government are known to have accumulated breathtaking fortunes abroad in bank accounts, mansions and staggering precious assets, including, *The New York Times* reported, a solid gold bathtub appraised at $5 million. Western diplomats and economists have unofficially estimated the private wealth exported by top government officials in the Second Republic at $5–$7 billion.[4] Soldiers have recently found millions in cash in the homes of arrested politicians.

III

Whether or not corruption was on a greater scale than it had been in the most freewheeling days of the military, its effects were certainly more devastating. For it came at a time when the country was manifestly less able to afford it, when the disastrous decline in Nigeria's oil income meant that every naira stolen or wasted sank the country further into debt and depression. During the slightly more than four years of civilian rule, foreign currency reserves plunged from $8 billion to less than $1 billion. External debt spiralled from roughly $4 billion to $15 billion. By the time of the coup, Nigeria was believed to be more than six months and $5 billion in arrears on short-term payments to creditors and suppliers. What was smuggled abroad probably equalled or exceeded those arrears. What the government paid to ghost workers may have represented a third or more of the debt it accumulated under civilian rule.

One can hardly overstate the devastating effect on Nigeria's

[2] *National Concord* (Lagos), July 16, 1983.
[3] *Daily Sketch* (Ibadan), August 27, 1983.
[4] *The New York Times*, January 20, 1984.

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economy of the precipitous decline in oil income, from a peak of $24 billion in 1980 to $10 billion in 1983. But it is seriously misleading to suggest, as many Western commentators have, that this decline was, in itself, or in the form of President Shehu Shagari's austerity budgets, the cause of the coup. With so much of the oil wealth going into capital spending, and corruption and waste, the impact of the recession on daily life could have been substantially cushioned by policies that sought to spread the burdens of adjustment fairly across classes and segments of society. Disciplined execution of the President's austerity plans and emergency measures could have made a real difference. But as Nigeria's new head of state, General Muhammed Buhari, related in a recent interview, "We were convinced that the former regime did not have the discipline or will to arrest the deterioration of the economy."[5]

The second basic cause of the coup was that the civilians grossly and callously mismanaged the economy, and so heightened considerably the burden of the recession on people's lives. The decline in oil income caused a sharp decline in imports, especially of basic commodities and industrial raw materials. As a result, factories retrenched to fractions of their capacity, laying off tens of thousands of workers, and—partly also as a result of ruthless hoarding—prices of staple foods and basic commodities skyrocketed.

In such a situation, the urgent need was to allocate scarce foreign exchange to the importation of raw materials and basic consumer goods on a priority basis. This the Shagari government promised but failed to do. Foreign exchange continued to be drained by the elite for luxury imports and foreign travel. Illicit sales of import licenses seemed to increase. To legitimate businesses in desperate need, they remained unobtainable (except perhaps for an exorbitant premium). Rice continued to be hoarded in profiteering by the powerful and well-connected. Those assigned to break up the bottlenecks were frequently the worst offenders. Shortly after the coup, more than 500,000 tons of rice allocated by the Presidential Task Force, along with 200,000 bags of sugar and hoards of other commodities, were found in a warehouse on the outskirts of Lagos.[6]

At the state level, things were even worse. In a large number of the 19 states, teachers went on strike in 1983 after going four to six months or more without pay. Strikes by unpaid civil servants temporarily shut down some state governments. With emergency loans from the federal government, released after a threatened national strike on the eve of the elections, state governments started

[5] *The New York Times*, January 18, 1984.
[6] *West Africa*, January 16, 1984, p. 135.

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operating again, but many school systems remained shut down. By the time the soldiers took over, some areas had gone for more than a year with no schooling. Hospitals were without drugs, and cities suffered ever longer and more frequent breakdowns of water and electricity. Incensed at the growing gap between the suffering of ordinary people and the high living of the elite, trade unions were becoming newly restive. Everywhere one turned, there was evidence of an economy on the edge of collapse.

IV

Disaffected Nigerians pondered two avenues of hope. One was to change the incumbents of power in the five weeks of national and state elections in August and September 1983. The other was to change the political system altogether, to displace the politicians of all the parties and bring back the only alternative, the military.

A large proportion of the Nigerian electorate had come to favor the latter option. My own pre-election survey in Kano state, the largest and most politically volatile in the country, showed a majority of the state's electorate and two-thirds of voters in the city of Kano favoring a military government.[7] The survey revealed what astute observers knew to be true: that a great many Nigerians not only preferred the military but were actively praying for its return to power. They were disgusted with the corruption and waste of civilian rule. They were angry about the shortages and high prices of basic commodities, especially food. They felt that most of the politicians were selfish and deceitful, and responsible for the country's economic distress. And they were frightened, especially in the cities, by the rising levels of thuggery and political violence as the elections approached. After hundreds of deaths and thousands of casualties in clashes between parties and party factions, this weariness of political violence, and fear for the safety of one's self and family, was an important current in the growing disaffection with civilian rule.

With the approach of the elections, a growing proportion of the counter-elite among the intelligentsia, including, one can safely speculate, much of the junior officer corps in the military, had also come to favor the more systemic change, feeling that the politicians were all pretty much the same and that the system was irretrievably rotten. This group waited to see if serious change was possible

[7] The survey was conducted among 880 adults of voting age, about half from the capital city of Kano, and half from towns and villages in the countryside. Respondents were randomly selected from all the major urban wards of Kano, and from roughly a third of the other Local Government Areas in Kano state.

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within the system, by constitutional means. They saw the elections as the last chance for the Second Republic to redeem itself.

That chance was ruined by grave and massive electoral fraud. Ballots were obtained in advance of the polling days and thumb-printed in assembly-line operations for candidates of the ruling party. Electoral officials at virtually every level were bribed to falsify election returns. Hired agents carrying fraudulently accumulated voter registration cards were sent or driven about town to vote ten or 20 times in a single election. Elsewhere, whole communities were disenfranchised by administrative ineptitude or deliberate sabotage.

Malpractices were engaged in by all the parties, but they were employed most systematically and on the most reckless scale by President Shagari's ruling National Party of Nigeria. Most disturbingly, in many of the less developed northern states, NPN agents collaborated with electoral officials and police, and in some instances traditional rulers, to prevent opposition party agents from exercising their legal right to observe the polling and vote-counting from beginning to end. In the absence of this most basic and crucial check on electoral fraud, unbelievable results were reported and announced.

Overall, the NPN not only reclaimed the presidency with a decisive first-ballot victory, but increased its governorships from seven to 13, and its standing in the National Assembly from a very shaky plurality to two-thirds. Some of Nigeria's most corrupt and unpopular politicians were reported reelected. Few of the results were overturned in court. All but one of the incredible gubernatorial outcomes were upheld. In that lone case, a defeated governor of an opposition party was found to have been reelected by more than a million votes.

Because the first round of voting, for the presidency, was impressively peaceful and orderly, the foreign press pronounced it a success and President Reagan, in an unfortunate remark that was widely resented in Nigeria, hailed the voting as a "triumph for democracy." Western governments and newspapers have clung to this view, despite reports from diverse areas of the country, indicating, with impressive consistency and often elaborate documentation, the various devices by which the elections were rigged and the will of the electorate hopelessly obscured and thwarted.

The elections were a sham, and a disaster for the country. More than 100 people were killed and $100 million in property destroyed in rioting that followed the announcement of the gubernatorial elections in a few of the states. Approximately 300 million naira (more than ten percent of the federal government's recurrent

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budget last year) was invested in this disaster. It can hardly be wondered why the military decided that the country could not afford this kind of "democracy."

From the soldiers' own words, it is clear that the rigging of the 1983 elections was a major reason for the coup. The return to power by fraud of the very politicians who had bled and mismanaged the economy was probably the final development that set in motion the dynamics that led to the coup. When the reinaugurated President Shagari moved, impressively in the view of some observers, to upgrade the quality of his ministers and advisers and launch new austerity measures, it was too little, too late, and no longer credible to the country, or the military.

V

With the failure of Nigeria's second attempt at democratic government since independence, many observers will conclude that democracy is dead in that country. This will be the latest in the long series of Western myths about Nigeria. The apparent motives, popular reception, and initial posture of the military strongly suggest that this takeover was undertaken for democratic, rather than authoritarian, reasons. Significantly, the independence of the press and the judiciary have so far been preserved. Certainly, the public would react to their curtailment. Philosophically, the country remains deeply committed to democratic principles. The people continue to aspire for authentic representative government. Nigeria remains in search of democracy.

In the coming months and years, as the new military government addresses itself to the current economic emergency and seeks to repair the damage of the past, Nigeria will be searching for a political formula and a set of structural reforms that will permit the development of a more genuinely democratic government, one which will be responsive to the country's needs, one which will endure.

Many lessons must be drawn from the failure of Nigeria's Second Republic. Three appear especially important to the future of democracy in Nigeria. First, Nigeria must deal effectively with the problem of corruption. The root of the problem is not simply greed. There can be no doubt that greed has run wild in Nigeria, but this is only the symptom of a social structural failure. Hence, attacking the deterioration in values by an "ethical revolution" (which President Shagari pronounced, but made no tangible progress toward) will not dramatically reduce corruption, any more than moral appeals alone have been able to end structural racism in the

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United States. Structural problems require structural solutions. A growing consensus of public opinion in Nigeria intuitively recognizes this point: that Nigeria will not be able to control corruption and develop responsive and accountable government until the conduct of its public servants is vigorously monitored and the criminals among them are regularly prosecuted and punished.

In fact, the necessary laws and structures already exist on paper, and one of the most hopeful signals for the future is General Buhari's indication that his government intends to take them seriously (he gave his new ministers six weeks to declare their assets). The 1979 Constitution contained, in its Fifth Schedule, a Code of Conduct for Public Officers. If it had been respected and permitted to function as envisioned, the Second Republic might have survived. The Code requires every public officer to declare all his assets at regular intervals to the Code of Conduct Bureau, a body designed to monitor compliance with the Code's strict anti-corruption regulations. Initially, only the President and Vice-President complied. By 1983, most public officials had still not done so, many refusing even after the Bureau finally released their names to the press. Nigerians knew that it was absurd for the President to be talking about an ethical revolution when he failed to dismiss ministers who refused to honor this most elementary principle of public probity.

The Code of Conduct also provided for a Code of Conduct Tribunal, a quasi-judicial body empowered to hear charges of corruption, and to impose serious penalties, including vacation of office, seizure of assets, and disqualification from office for ten years. But neither the Bureau nor the Tribunal ever worked as envisioned because the National Assembly, upon whose action the Constitution unfortunately made their coming to life dependent, buried the enabling legislation. Without this legislation, the Bureau was unable to hire any permanent officers, or to investigate suspicions or complaints. The Bureau never really functioned. The Tribunal never sat.

Conditioning the functioning of these bodies on the politicians they were to regulate was one of the few basic flaws in the 1979 Constitution, but it was of fatal proportions. The same could be said for the Federal Electoral Commission, whose disastrous administration of the 1983 elections was another major cause of the coup. Like the members of the Code of Conduct Bureau, the members of the Federal Electoral Commission (and other federal commissions, such as those overseeing the judiciary, the civil service, the police and the census) were to be appointed by the President, subject to Senate confirmation. And of course their funding as well

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was dependent on appropriations by the National Assembly. In effect, the politicians were expected to regulate themselves. The fox was asked to find the guards and locks for the chicken coop.

Implicit in this is a second crucial lesson. Nigeria is not yet at a point in its development when politicians can be expected or trusted to regulate themselves. Nor is the separation of power between executive, legislature and judiciary sufficient to limit the abuse of power. In the Western mindset, this is tantamount to saying that democracy is not possible. This conclusion does not logically follow. If the crucial functions of regulating conduct and administering elections cannot be entrusted to the ultimate authority of the politicians, there is in Nigeria an alternative authority, the military. There is no inherent reason why it cannot be employed to check the abuse of power by civilians while they are governing, rather than having continually to put an end to their abuses and clean up their mess by overthrowing them. This as well reflects a growing sentiment in Nigeria.

This by no means assumes that the Nigerian military is incorruptible; during the oil boom, corruption grew to serious levels under military rule. But in Nigeria's 23-year history, the military has been the only institution that has shown the disposition and capacity to combat the problem. Spanning the country's deep ethnic cleavages better than any other major institution (if still uneasily), the armed forces constitute, not only in their self-conception but in the public mind, the ultimate guarantor of the national welfare. Unlike the military "guarantors" of many other Third World nations, they have ruled without systematically abusing human rights, and continue to show a sensitivity to basic liberal concerns.

The brief seven-month rule of General Murtala Muhammed, assassinated in a failed coup attempt early in 1976, still symbolizes for most Nigerians the capacity of the military to strike boldly against government corruption and waste, and to impose discipline and purpose in public life. The new Buhari government has identified openly with this legacy, and this identification appears to be even more intensely felt among the ranks of the junior officer corps. These junior officers—reflecting an increasingly intense idealism and anger among younger Nigerians and junior bureaucrats and professionals—will be closely watching the conduct of their senior officers for some time to come. They should constitute an important check on those military officers chosen to regulate the conduct of a civilian government.

After hundreds more deaths and thousands more casualties in political combat, and billions lost to political corruption, there is a

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third lesson. Something is fundamentally wrong with politics in Nigeria: it has come to matter too much, to weigh too heavily on social life.

The primary source of economic crisis and political decay in Nigeria today is the lengthening shadow of the state over every other realm of society. Since independence, the state has been the chief arena for the accumulation of wealth and the acquisition of resources, and has been becoming so ever more decisively. Too much of the country's wealth is mediated through government contracts, jobs, import licenses, development projects and so on. Too little is accessible through any activity substantially independent of the state. As a result, power has replaced effort as the basis of social reward. Hence, "a desperate struggle to win control of state power ensues since this control means for all practical purpose being all powerful and owning everything. Politics becomes warfare, a matter of life and death."[8]

The lesson is not limited to the political structure. For many years Nigeria's economic system has not been working. A false confidence was bred by the global oil boom, which obscured and accentuated the deep structural problems of the economy. The collapse of the world oil market finally exposed the reality of an economy that had developed no other significant sources for generating new wealth—and in fact had allowed to atrophy the one it had traditionally relied on: agriculture. In the midst of Nigeria's current depression, the source of its economic troubles is now more clearly visible: a system of state socialism without any socialist commitment to justice, or distribution, or even growth. Lacking such commitments, state socialism reduces to state gigantism, and state control becomes its own justification. Lacking both productive state investments and significant private enterprise, the economy reduces to the swollen state, feeding voraciously on oil.[9]

Effective social control can reduce corruption and political thuggery and chicanery by punishing them. But law and punishment are not enough. It is unlikely that Nigeria can sustain democratic government or achieve self-sustaining growth so long as the state looms so large in social and economic life. This is a difficult and painful lesson: the size of the state must be reduced. Many of the

[8] Claude Ake, Presidential Address to the 1981 Conference of the Nigerian Political Science Association, *West Africa*, May 26, 1981, pp. 1162–63.

[9] For a related view, tracing economic stagnation to the absence of "growth impulses" outside the oil sector and "the utter predominance of government as a source of fortune," see Sayre P. Schatz, "The Inert Economy of Nigeria: From Nurture-Capitalism to Pirate Capitalism," *Journal of Modern African Studies*, 22(1), March 1984.

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tentacles that have lifted the privileged to fantastic wealth must be cut off.

VI

Despite the disillusionment with the Second Republic and the outpouring of relief and joy over the coup, Nigerians have never wanted permanent military rule. As it has during previous military regimes, public opinion will eventually demand the installation of some kind of civilian, democratic government. There are no adequate precedents for the kind of political structure that might meet Nigeria's unique needs. But such a system could be based on three principles common both to democratic theory and to Nigeria's current aspirations: (1) accountability of rulers to the ruled; (2) pluralism in social, political and economic life, involving dispersal of resources and competition between ideas and preferences; and (3) checks and balances to prevent the accumulation and abuse of power.

None of these principles is incompatible with a political system that makes a place for the military in the regulation of political competition and conduct. Each of them is reflected, in one way or another, in the cultural traditions of Nigeria's many peoples.

It is now a fact of political life in Nigeria that accountability cannot be assured, and abuse of power contained, by conventional checks and balances alone. Over the past two decades, the most crucial balance has been not between executive and legislature, or between these and the judiciary, but between military and civilians. The path to political stability in Nigeria requires institutionalization of a role for the military as a fourth branch of government.

In fact, the idea is not as alien to Nigerians as it may seem to many Westerners. In other Third World nations, military regimes have experimented with partial withdrawals, typically permitting, however, less democratic control than Nigerians demand. But the idea of "diarchy"—sharing of power between civilians and soldiers—has also been advanced within a strongly democratic framework by one of the founding fathers and leading figures of Nigerian politics, Dr. Nnamdi Azikiwe. During Nigeria's first military government, which ruled from 1966 to 1975, Azikiwe proposed that the "armed and security forces" constitute a "fourth arm" of government in Nigeria's next civilian constitution. The corruption and abuses of power from 1960 to 1966 under the civilian First Republic (of which Azikiwe himself was President), and the military coup which overthrew it, demonstrated, said Azikiwe, "not . . . that the military caste is perfect or that civilians are imperfect," but that

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"civil rule depends upon the military establishment as a sanction for the maintenance and enforcement of the law." Until developing nations "have had sufficient experience and maturity in handling human problems with reason and finesse, and until they have become disciplined in their personal lives, community living, and the exercise of political rights and privileges," he proposed "incorporating the military hierarchy on a more active basis in a civilian-based administration, to make it stable."[10]

Specifically, Dr. Azikiwe proposed ex officio membership in the Council of Ministers for the heads of the army, navy, air force and police, and a collective veto by them over any policy "affecting the rule of law, the democratic process, individual freedom" and so on. This may, however, be too diffuse and too limited a formula to ensure democracy and stability. The need is not to incorporate soldiers into the policy formation process, but to have them stand as watchdogs over the conduct of politics and public life: to insulate from partisan pressures and abuse those institutions that must remain above party conflict and independent of party control if the democratic process is to work.

The experience of the Second Republic points to several institutions that should be removed from the direct or indirect control of elected officials and entrusted to the supervision of the military:

—*The Code of Conduct Bureau and Tribunal.* As the key to monitoring and punishing corruption, these bodies, as described above, must remain free of political manipulation and control.

—*The Federal and State Electoral Commissions.* However elections are structured and timed, they must be perceived as substantially free and fair. It is unlikely that electoral commissions appointed and funded by elected officials will be able to achieve such a result in the foreseeable future. The experience of the 1979 elections suggests, by contrast, that military supervision of electoral administration is far more likely to limit electoral fraud and malpractice.

—*The Police Service Commission.* As the hands-on regulators of political campaigns and demonstrations, the police are instrumental to the democratic process in Nigeria. Partly to discourage political manipulation and abuse of the police, state police forces have been banned since the First Republic. The best way, however, to ensure the political independence of the police under a new civilian regime would be to entrust the military with the appointment and supervision of the Police

[10] "Democracy With Military Vigilance," reprinted in *The Sunday Triumph*, (Kano, Nigeria), August 28, 1983.

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Service Commission, which appoints and exercises disciplinary control over all police officers.

—*The Judicial Service Commissions.* Although the courts made some courageous decisions under the Second Republic, limiting executive power and upholding individual freedom (especially that of the press), their image suffered in the bitter legal wrangling over the disputed 1983 election returns, few of which the courts reversed. Military control over the Judicial Service Commissions, which recommend judicial appointments, would enhance public confidence in the independence of the judiciary and might better insulate it from partisan politics.

—*The National Population Commission.* Though purely administrative on its face, the collection of government statistics and population figures plays a crucial role in the distribution of government power and resources in a society where virtually everything of value seems to flow from the state. Since independence, no reliable Nigerian census has been taken; both the census of the First Republic and that of General Yakubu Gowon's government were subjected to widespread inflation and then bitter sectional conflict. Fraud and controversy in this area may never be entirely eliminated. But even if supervision by the more disciplined military could not produce a more reliable accounting, it would at least insulate the census process from partisan politics, and so limit the damage the controversy might do to the democratic system.

A constitutional formula like that above would be innovative, but not anti-democratic. It would leave the formation and execution of policy entirely to civilians. It need not encroach on a single substantive area of government—not even the funding and deployment of the military itself. It would assign to the military only those regulatory and administrative functions vital to democratic stability and highly vulnerable to political abuse at Nigeria's current stage of political and economic development.

In what Dr. Azikiwe called "democracy with military vigilance," the supervisory tasks assigned to the military could be performed by a Supreme Military Council (SMC), the type of body which now governs Nigeria and did in previous military regimes. This Supreme Military Council could be constituted, as it is now, primarily or entirely of soldiers chosen by the military and balanced in ethnic and regional composition to "reflect the federal character."

A crucial problem would concern the nature of reciprocal control between the military and the civilians. Clearly, the SMC itself would

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have to be independent of civilian manipulation. On the other hand, this would not mean that civilian control could not be exercised over the military itself, including its promotion and deployment. Under a system of civilian control over the military, the independence of the SMC would probably be maximized if its members, upon election, took leave or retired from active military duty, and if their salaries were constitutionally pegged to those of the civilian officials. The SMC would then be empowered to fix the salaries and budgets of the five commissions under its supervision, which the civilian legislature might have the constitutional power to query and review, but not to refuse to allocate. This would be the most serious compromise of democratic control in the system, but it is difficult to imagine how the independence of these bodies can be otherwise ensured.

VII

A system of diarchy along the lines outlined above can provide the structural supports, the integrity for crucial regulatory institutions, that the Second Republic needed and lacked. It can make the difference between democratic success and failure in Nigeria, until such time as Nigeria has developed the "maturity" and "experience" and "discipline" to be able to dispense with military vigilance. There will probably be a need for such vigilance for at least ten years, and probably a generation. As Dr. Azikiwe proposed, the military role in government could be constitutionally mandated for a fixed period of time, after which its future existence would be put to the people in a national referendum, and continued until they voted to end it.

There remains the very large question of what the civilian component of a new democratic system in Nigeria might look like. When the national debate comes, it will probably center on whether the system should take a parliamentary or presidential or some altogether new form, and whether the system should be based on competing parties or ban them altogether.

When the Supreme Military Council established the Constitutional Drafting Committee in 1976, it instructed it to find ways to limit the proliferation of parties and even consider means of forming the government without parties. The CDC was able to do the former successfully, but was unable to do the latter. It concluded that political parties were indispensable for articulating and aggregating competing political preferences in a modern, large-scale democratic system. In a recent interview, General Buhari expressed the view that there was nothing wrong with Nigeria's recent dem-

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ocratic system as such, that the problem was with "those who operated it, and the way they operated it."[11]

There is likely to be considerable sentiment for crafting an entirely original political structure that borrows more heavily from Nigeria's traditional political cultures. Some will argue for a more explicit role for Nigeria's traditional rulers, both those of the larger and more centralized traditional kingdoms—the Emirs of the Hausa-Fulani, the Shehu of Borno, the Obas of the Yoruba, and the levels of authority below them—and the chiefs of the more decentralized political structures of the Ibo and many minority peoples. Though their formal powers of taxation, adjudication and administration were largely dismantled during the previous period of military rule, these traditional rulers remain, in turbulent times, a significant (and to many Western observers, surprisingly tenacious) source of cultural continuity and conflict mediation.

Others will oppose the restoration of their formal authority, partly from concern that drawing traditional rulers too directly into politics and government will threaten their effectiveness as healers of conflict and guardians of overarching cultural values. In any event, much more serious thought than before will probably be given to the need for meaningful participation at the local level, where traditional systems of communal assembly and decision-making are most directly applicable.

Whatever system the Nigerians devise, they are almost certain to seek a structure that is less expensive and cumbersome than the Second Republic, which allocated hundreds of millions of naira each year to the pay and perquisites and offices and staffs of 95 senators, 449 representatives and 1,347 state legislators. Nigerians will likely demand a smaller, leaner legislative branch—perhaps including a unicameral national assembly, able to dispose of legislation more quickly—and limits on the direct and indirect remuneration of members. Ways will also be sought to limit the size and costs of administering the executive branch; under the Second Republic, the office of the President alone claimed ten percent of the 1983 recurrent budget.[12]

What will certainly remain in place in Nigeria is a federal system of multiple states. Despite the pressures for creation of new states, and the continuing debate over the proper balance between the

[11] *The New York Times*, January 18, 1984.

[12] Onyema Ugochukwu, "The High Cost of Democracy," *West Africa*, February 6, 1984, pp. 257–258. Between the National Assembly, the presidency and the Federal Electoral Commission, almost 30% of the 1983 recurrent budget was eaten up by administrative costs. The recurrent budget, which makes up slightly more than half of the overall budget, excludes long-term capital expenditures.

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center and the states, Nigerian federalism has been reasonably (even remarkably) effective in breaking up the hegemony of Nigeria's largest ethnic groups, decentralizing ethnic conflict, dispersing development, fostering cross-cutting cleavage, and in general containing the powerful centrifugal forces inherent in Nigeria's ethnic composition. Though it is expensive to operate—with 19 state governments and a requirement that federal appointments and resources be evenly and fairly distributed across the states—this federalism was one dimension in which the Second Republic achieved decided progress over the First.

VIII

Major structural reforms are also needed in the Nigerian economy, not simply to promote more balanced and self-sustaining growth, but also to relieve the destructive pressure of economic aspirations on politics and government.

The size of the state—the range of its economic activities and especially its direct ownership and control of production and distribution—must be reduced. Ironically, this appeared to be developing as a major policy thrust in President Shagari's post-election administration, which, when it was overthrown, was preparing to announce a plan for divesting itself of certain public enterprises.

The goal, if not the plan, should be retained. There is hardly a dimension of economic life in which the Nigerian state is not actively engaged today. Obviously, the size of the oil sector—which accounts for more than 90 percent of export earnings and more than 80 percent of government revenue—sets sharp limits to how far and how fast a reduction of state involvement can proceed. Certainly there is no sentiment in Nigeria for any privatization of the petroleum industry. But private enterprise in other sectors can be fostered, and state intervention reduced in both scope and degree. Statutory corporations at both the federal and state levels are involved in mining, agriculture, printing, banking, insurance, shipping, supplying, hotels, electricity, construction, telecommunications, radio and television. Some perform strategic functions; most do not. Some make profits; many operate at large and continuous losses.

The state should divest itself of those corporations for which state ownership cannot be justified by explicit criteria, such as importance to the national economy (e.g., public utilities and mining), the huge capital outlays required (steel), or importance to national security

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(mining, weapons production and external telecommunications).[13] A large number of government companies meet none of these tests. These should be sold, even where an initial period of tax relief and subsidized credit is necessary to induce local entrepreneurs to assume the risk of operating them for profit. Because they have been especially prone to abuse, overseas procurement and bulk purchasing and distribution should also be phased out as state activities. This would require dismantling such bodies as the Nigerian National Supply Company and the Presidential Task Force on Rice, which the Shagari Government was also said to be planning.[14]

One area where a reduction in state ownership might make particular sense is the mass media. Government newspapers, particularly those owned by state governments, have been losing readership at a striking pace to the rapidly growing private papers. The latter have been demonstrably freer to criticize policies and expose the corruption and abuse of power. Partly for this reason, they have been livelier and more interesting to read, and have been attracting the nation's best journalists and editors. There is an understandable desire for a national government in a developing country to want some semi-official organ of expression, but Nigerians are showing by their purchasing decisions a preference to see many of the state government newspapers terminated or sold.

Another interesting innovation would be to break the state's monopoly on radio and television broadcast, entrenched in the 1979 Constitution, and permit private ownership. This would not only open one of the economy's most dynamic sectors to private entrepreneurship, but would also promote the pluralism of information and ideas that is an important condition of liberal democracy. Almost certainly, it would also improve the quality of radio and television news, which in the late regime degenerated into advertisements and apologies for the rulers of the day.

Beyond shrinking the state through divestment and retrenchment, the private sector must be stimulated. Selling existing public enterprises to private Nigerians will not be sufficient. Means have to be found to foster the element of capitalism which is most crucial to growth and yet has been most elusive in Nigeria—entrepreneurship. Nigerians who have wealth and ideas have to be encouraged to invest them at risk in the hope of profit. Nigerians are not irrational economic actors. By and large, they have not put their wealth at risk in productive new ventures because they have not

[13] Adeoye A. Akinsanya, "State Strategies Toward Nigerian and Foreign Business," in I. William Zartman ed., *The Political Economy of Nigeria*, New York: Praeger, 1983, p. 167.
[14] *Nigeria Newsletter*, No. 129, December 19, 1983, p. 2.

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had to. Easier, risk-free avenues of investment have been open to them in the form of inflated contracts from the swollen state, black-market currency manipulations and share purchases in transnational corporate affiliates. If the substantial capital that has accumulated in private hands in the past two decades is to be put to risk—and to work—these other avenues of investment must be closed off or made less attractive.

Two areas of reform appear promising. First, the award of government contracts in every sector and at every level must be reformed, establishing new performance incentives and imposing effective penalties for default. Most important, competitive bidding must become a serious requirement, with established procedures for contract review and managerial accountability.

Second, means have to be found of correcting the perverse effects of existing legislation regarding the investment behavior of private Nigerians. The Nigerian bourgeoisie now has the character primarily of a "comprador" elite. Its most significant investments are in the Nigerian affiliates of transnational corporations, where it has been able to achieve profitable returns with very little effort or risk. This development has been encouraged by the legislated "indigenization" requirements for Nigerian participation (at 40 or 60 percent, depending on the sector) in the equity of foreign investments in Nigeria.[15] Little has been done to encourage Nigerian investment in new private ventures, particularly in production, rather than in the varieties of intermediary trade that now account for most of the enterprise of private Nigerians.

As other analysts have proposed, the government could tax (through withholding by the corporation) the dividends and other earnings of Nigerian shareholders in transnational corporations. These funds could then be used by the Nigerian shareholders as income tax credits and subsidies to finance new investment in those economic sectors and activities where the government determines that local capital investment will lead to accumulation. Thus, "the state could encourage reallocation of private sector investment away from comprador, intermediary activities toward productive investments with a potential for indigenous accumulation."[16] In doing so, the state would encourage "the emergence of effective local competitors to foreign capital" and so, for the first time, an authentic,

[15] Thomas J. Biersteker, "Indigenization in Nigeria: Renationalization or Denationalization?," in Zartman, *op. cit.*, pp. 185–205.

[16] *Ibid*, p. 204.

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indigenous capitalism—and a more viable economic foundation for liberal democracy.[17]

Reforms such as these to reduce state intervention and foster private initiative need not—and must not—heighten Nigeria's already immense income inequality. In principle, they would probably diminish inequality by expanding the supply of jobs and reducing corrupt appropriation of the huge concentrations of wealth in the public sector. In any case, what Nigerians resent is not individual wealth per se, but the riches that have been garnered at the expense of society, and so have failed to improve the standard of living of ordinary people. Even spectacular entrepreneurial success is unlikely to be resented if it generates a surge of new income and jobs at the mass level.

To the extent that large-scale investments of private capital generate new, socially distressing inequalities, these can be moderated with a progressive income tax substantial enough to generate revenue (for meeting basic needs and perhaps for loans to small businesses and tax credits for the employment of new labor), but not so steep in its marginal rate as to discourage investment. Indeed, the development of the bureaucratic capacity to collect income taxes—now largely evaded outside the formal payroll—is one of the more urgently needed reforms. This is one dimension in which the state needs to become not smaller or larger but more effective.

In other areas as well, limited state intervention—such as making available subsidized credit, fertilizer, pesticides and simple technology to small farmers—can significantly reduce poverty and inequality. In any developing nation today, even one without oil, the state is bound to be a significant player in the process of economic growth. But the degree of state intervention matters; on both economic and political grounds, subsidies to small producers and incentives to indigenous private investors often make far more sense than direct state production.

The structural evolution envisioned here would be toward a Nigerian state that is leaner but also more effective. The state's direct role in production would be reduced, but its modern macroeconomic instruments of taxation and tax incentives would be developed. And revenue bases would be developed outside the central state, reducing the extraordinary dependence of state and local government on the center, and so generating a stronger system of federalism.

[17] *Ibid.*

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IX

Nigeria stands now at a historic crossroad. It is well into its third decade of independence and its second as one of the world's major oil producers. Deep social contradictions fester—between the spectacular wealth of a narrow dominant class and the suffering of impoverished masses; between the oil boom's promise of a great leap forward in national development, and the reality of waste, indiscipline, stagnation and drift; between the expectations of an exploding young population for education and jobs and a chance to shape the future, and a system in which schools are collapsing, jobs disappearing and the future caving in.

These contradictions cannot be peacefully contained through another long period of corrupt and ineffective government—military or civilian. Anger and disillusionment are gathering among the young in Nigeria. They are expressed more coherently and analytically among educated young Nigerians in the universities, and the junior ranks of the bureaucracy and the military, but they are no less fierce among the poor and the dispossessed, especially in the cities. If genuine change and tangible progress are not soon forthcoming, sentiment for more radical and extreme alternatives, both secular and religious, will undoubtedly gather momentum.

The new government of General Buhari appears, by its initial actions, to be acutely sensitive to what is at stake. Dominated by relatively young officers who played key leadership roles in the last military government of Generals Murtala Muhammed and Olusegun Obasanjo, and by civilians with extensive experience in government and public life, it has projected an early image of toughness, but also sobriety and deliberation. Many top officials in the civil service, the police, and the customs have been dismissed or retired. Symbols of the arrogance and extravagance of the Second Republic, such as official Mercedes Benz cars, have been removed. Imports and travel allowances have been slashed and a new system installed for allocating scarce foreign exchange to the economic sectors most in need. And a large number of politicians and public servants have been arrested. Initially, more than 650 were detained; several hundred remain in custody on suspicion of malfeasance in office.

How these former public officials are dealt with will profoundly affect Nigeria's future political stability and capacity to control corruption. With the possible exception of the price of staple foods, there is no issue in Nigeria today that more sharply focuses the accumulated public anger at the deteriorating state of the nation. Nigerians believe that the misappropriation of billions of naira in

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public funds—at a time when the country is stalled in economic recession and agonizing poverty, with one of every eight infants dying before the age of one—constitutes a serious crime for which the guilty must be held accountable. The demand for justice is in no way inconsistent with strict due process that guarantees all accused a fair trial. But it is felt with a striking intensity, not only by the junior elements of the intelligentsia, but also among some of the most sober quarters of the business, professional and journalistic communities. Failure to document and punish the corruption of the past four years could have explosive consequences.

The question of accountability strikes at the very heart of the problem of future Nigerian democracy. Chinua Achebe, a leading Nigerian novelist, cogently expressed this basic popular sense when he wrote recently that "with each succeeding regime, our public servants have become more reckless and blatant" in their corruption, at least in part because "there has not been one high public officer in the 23 years of our independence who has been made to face the music for official corruption."

Whether this issue is resolved depends in part on the West. A number of fugitive public officials have fled to Europe and the United States. Will they be extradited back to Nigeria by the appropriate treaty arrangements and due process, upon the request of the Buhari government? Enormous liquid and fixed assets are known to have been accumulated abroad through the corrupt transfer of public wealth by leading Nigerian officials. Will Western banks and governments cooperate in repatriating to Nigeria whatever wealth the Buhari government can demonstrate to have been stolen from the Nigerian public?

With respect to the economy, the Buhari regime's urgent priorities are apparent. Public spending must be sharply reduced, foreign exchange must be conserved for essential needs, and external debt—which will require roughly a third of Nigeria's expected $11 billion in oil revenue to service this year—needs to be refinanced. Crippled by a severe drought in the north that figures to increase her annual food import bill of $2 billion, Nigeria also needs to increase its oil revenue, and hence its 1.3-million barrel per day quota within the Organization of Petroleum Exporting Countries. The Buhari government has been moving aggressively on all these fronts, but, unfortunately, new international credit and increased oil revenues depend on global circumstances and power centers beyond its control. The pragmatic interest of these international institutions in giving Nigeria more financial room for maneuver at this crucial moment of adjustment is compelling, but there is no

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clear evidence that it will be recognized. Here as well, Western nations, perhaps especially the United States, can make an important contribution to Nigeria's economic and political recovery.

One hardly needs to recount the stake of the United States in the future of Nigeria, which has been, over the past decade, not only one of our largest and most reliable foreign sources of petroleum, but also one of the best hopes in sub-Saharan Africa for moderate and broadly based government, sympathetic—or at least not hostile—to the West. During the Second Republic the United States was seen as closely linked with the Shagari government, despite mounting evidence of widespread corruption, abuse of power, and finally, electoral fraud. Some American individuals and businesses were known to have collaborated in private ventures and to have advised the election campaigns of Nigerian politicians whose integrity was widely doubted. For these reasons the United States has come, perhaps even dangerously, to be associated in the minds of young Nigerians with the rot and injustice that have overtaken their society.

A new approach can change that perception. It is in our national interest now to show not only flexibility and sympathy in assisting Nigeria to restructure its painful international financial obligations, but also real willingness to cooperate with the Nigerian nation as it struggles to establish the legacy of justice that is a precondition of accountability, and as it searches, in new ways, and on its own terms, for democracy.

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Nicholas Guppy

TROPICAL DEFORESTATION: A GLOBAL VIEW

Tropical rain forest, today everywhere threatened with accelerating destruction, if conserved could be one of humanity's greatest renewable resources. In 1982 it occupied nearly 12 million (11,610,350) square kilometers of the continuously warm, high-rainfall areas of the globe that lie between the tropics of Cancer and Capricorn. Wherever it remains it forms a three-dimensional carpet, 40 meters or more thick, of intricately interwoven and interdependent individuals of several millions of species (including both plants and animals), and many life-forms—more than are found in any other terrestrial ecosystem. Its preservation is important for many reasons, but perhaps the maintenance of this genetic diversity is ultimately the most important, because it offers endless opportunities for mankind, and because it is irreplaceable.

More obviously, however, rain forest is a source of raw materials: timbers for construction, furniture, plywood, paper, and other uses; fuelwoods, fibers, canes, resins, oils and drugs; fruits and spices; and much else. It is also functionally important. Considered as a solar engine, it absorbs more sunshine than any other living land cover, moderating surface temperatures and reducing heat reflection into the atmosphere. It uses this absorbed energy to combine atmospheric carbon dioxide gas with water to form sugars and starches, oils and fats; and later, adding mineral salts and other

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Nicholas Guppy, now living outside Cambridge, England, has been a close student of tropical rain forests for more than 35 years, with extensive early travels especially in British Guinea and the areas north of the Amazon. He was a research assistant of the New York Botanical Garden for two years; advised Daniel K. Ludwig upon his Venezuelan property, and *Life* magazine upon "The World We Live In"; edited the Macdonald Nature Encyclopedia with Sir Julian Huxley; and was then head of Granada Television's Natural History Film Unit.

Between 1970 and 1980, Mr. Guppy traveled extensively throughout the New World and Far Eastern tropical forest regions, and in other areas of the globe. In 1980 he began writing about the problems of tropical deforestation (in association with the Threshold Foundation). He was consultant and co-author of the Time-Life book *The Amazon*, and has contributed to learned journals and books upon conservation, ecological and social themes. The author acknowledges with especial gratitude the encouragement and advice of William D. Rogers of Washington, D.C., and of Dr. Timothy C. Whitmore of Oxford University. Copyright © 1984, Nicholas Guppy.

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substances, to make proteins and innumerable complex materials; as a by-product, it is the largest terrestrial net producer of oxygen. It imbibes rainfall and ground water, and holds water close to the earth's surface, releasing it slowly into aquifers or as runoff into river systems, or transpiring it from its leaves into the atmosphere as water vapor, which later provides rain in other areas (over 50 percent of rainfall in Amazonia comes from such forest transpiration). The roots that anchor the forest to the ground stabilize soils, protect the landscape from wind and water erosion, desiccation and floods, and filter and purify water supplies: successful agriculture in the tropics often depends upon the maintenance of natural forest nearby.

For many years there has been alarm at the rate of rain forest clearance. But until a year ago there were no generally accepted figures for the size of the remaining areas in the 76 or more tropical rain forest countries, or for the rates at which they were being destroyed. Table I, "The Principal Tropical Forest Countries," on the following page, gives these areas and defines the forest types discussed herein as "rain forest." Today accurate, clearly explained figures for the major categories visible in satellite photographs are available as a result of the several years' work of the Tropical Forest Resources Assessment Project of the Food and Agriculture Organization of the United Nations (FAO).[1] These results have been summarized by J.P. Lanly, whose global figure for the area being cleared each year is 157,000 square kilometers (about the area of England and Wales combined).[2]

A world without the myriad plant and animal lives of rain forest, without the wonder and beauty it contains, would be immeasurably poorer. Yet unless we can halt this destruction, straight line projection gives a date 73 years ahead (2057) for the final demise of this currently still vast, irreplaceable sector of our planet. Spiraling population growth, rising consumption of timber and forest products, or demand for new agricultural land, could all bring this date nearer—even to the point where rain forests would be doomed within 20 years. War or pandemic could affect the trend, as could protectionism. Better by far, however, would be cooperative rational action with the aim of ensuring that natural rain forest is safeguarded in perpetuity.

It is inconceivable that technology or engineering could replace

[1] "Forest Resources of Tropical Africa"; "Forest Resources of Tropical Asia"; "Los Recursos Forestales de la America Tropical"; Tropical Forest Resources Assessment Project, Rome: Food and Agriculture Organization, 1981.

[2] Jean-Paul Lanly, "Tropical Forest Resources," FAO Forestry Paper 30, Rome: FAO, 1982.

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TABLE I

THE WORLD'S PRINCIPAL TROPICAL FOREST COUNTRIES BY AREA
(in square kilometers)

Country	*National Area*	*Undisturbed Forest*	*Logged/Managed Forest*	*Unproductive Forest*	*Total Forest Area*	*% World Total*
Brazil	8,511,965	2,886,300	120,000	556,500	3,562,800	30.68
Indonesia	1,903,650	389,150	346,600	400,000	1,135,750	9.78
Zaïre	2,345,409	797,400	3,800	255,300	1,056,500	9.09
Peru	1,285,215	373,200	60,000	259,900	693,100	5.97
Colombia	1,138,914	386,000	9,000	69,000	464,000	3.99
India	3,166,828	48,850	334,730	76,860	460,440	3.96
Bolivia	1,098,580	177,600	120,900	141,600	440,100	3.79
Papua New Guinea	475,300	138,150	2,200	196,750	337,100	2.90
Venezuela	912,050	76,000	116,100	126,600	318,700	2.74
Burma	678,030	141,070	90,090	80,770	311,930	2.68
Cumulative Total		5,413,720	1,203,420	2,163,280	8,780,420	75.62
And 63 Other Countries		1,270,430	720,350	838,550	2,829,930	24.39
World Total		6,684,150	1,923,770	3,001,830	11,610,350	100.00

NOTE: Figures are for Broad-Leaved Humid and Dry Forests with closed canopy; Coniferous and Bamboo Forests are excluded. "Unproductive Forests" may be so designated for physical or legal reasons.

After the ten countries listed above, the following 20 countries have the highest areas of tropical rain forest: Mexico, Congo, Malaysia (all), Gabon, Guyana, Cameroon, Surinam, Ecuador, Madagascar, Philippines, French Guiana, Thailand, Laos, Vietnam, Kampuchea, Nigeria, Ivory Coast, Nicaragua, Panama, Paraguay.

Countries omitted from estimates: Africa—Mali, Niger, Upper Volta; Pacific—Solomon Islands, Fiji, Vanua-atu, New Caledonia; Americas—Smaller Caribbean Islands.

SOURCES: Forest types and Areas from *Tropical Resources Assessment Project*, Rome: FAO, 1981. Country areas from John Paxton, ed., *The Statesman's Yearbook, 1983–84*, London: Macmillan, 1983.

the functions that rain forest performs for us free, without human input of energy, time, money or materials—let alone substitute for the materials that it manufactures. Already loss of rain forest puts a strain on us when we have to repair a watershed, stabilize an eroding hillside, flood-control a river, or purify the atmosphere—all of which are becoming commonplace activities wherever natural self-maintaining systems are locally overloaded. The scale and pressure of human demands on the environment is little appreciated, and it is growing: in 1975 every single man, woman and child in the United States used on average 40,000 pounds of *mineral* matter alone—of stone and cement, sand, gravel, natural gas, iron and steel, salt, petroleum, non-ferrous metals, coal and clay[3] quite apart from huge quantities of other materials—agricultural products, timber, marine life, water, and much else. And all this was used in commonplace ways—just in making buildings, roads, furniture,

[3] Gerald O. Barney, Ed., *The Global 2000 Report to the President: Entering the 21st Century*, Vol. 1, London: Penguin Books, 1982, p. 384.

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packaging, hamburgers, automobiles, newspapers, refrigerators, clothing, shampoos . . . things we take for granted. Some of these raw materials derive from renewable production; but the majority represent destruction of the environment *somewhere*. Per capita demand is much less over most of the world, and so is total demand, often despite higher population densities. Over large areas of the tropics, demand for exports to the United States, Western Europe and Japan is the preponderating factor in rain forest and environmental destruction.

The potential consequences of *total* rain forest destruction have attracted wide and serious discussion. They include, beside the loss of genetic material previously mentioned (and further discussed in Section V), dire environmental effects: massive erosion and landscape degradation in the wet tropics, causing a decline in agricultural productivity; population collapse, beginning in Southeast Asia around A.D. 2000 through starvation and disease, and spreading elsewhere later; and eventually a rise in sea level, caused by melting of the polar ice-caps due to increasing atmospheric carbon dioxide, which would act as a blanket and trap heat near the earth's surface. Tropical rain forests and their soils contain 20 percent of the world's terrestrial carbon pool of 500 billion metric tonnes, 46 percent of it in the living forest, and most of this is released as carbon dioxide when forest is destroyed.[4] Even more CO^2 would be released if the vast volumes of the gas dissolved in the oceans were suddenly to come out of solution as sea temperatures rose.[5] There have been various estimates of how rapidly this sea-level rise would occur; but eventually it could inundate the world's most populous and industrialized lowlands, and all of its largest cities.

To mention such possibilities, which rank with those of nuclear war, may seem alarmist. Yet disasters of equivalent magnitude have occurred in historical and recent prehistoric times, as the ruined desert cities of North Africa and Asia testify; or the fact that the Bering Straits and the English Channel were dry land only a few thousand years ago. No global model incorporates environmental factors adequately. Yet all predict critical, even catastrophic times ahead as populations grow, and as demand and the ability to exploit

[4] Sandra Brown and Ariel E. Lugo, "The Storage and Production of Organic Matter in Tropical Forests and their Role in the Global Carbon Cycle," *Biotropica*, Vol. 14, No. 3, September 1982, pp. 161–187.

[5] For discussions, see F. Kenneth Hare, "The Planetary Environment, Fragile or Sturdy?", *Geographical Journal*, November 1980, pp. 379–395; William W. Kellogg and Robert Schware, "Society, Science and Climatic Change," *Foreign Affairs*, Summer 1982, pp. 1076–1110; Philip Stewart, "Forestry for Carbon Dioxide Fixation," *Commonwealth Forestry Review*, Volume 57, No. 4, 1978, pp. 263–266.

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resources increase. In the destruction of tropical rain forest a crisis-point may be approaching between human activity and life-support systems. We have modified human behavior sufficiently in the case of nuclear warfare to have achieved a modus vivendi for several years, if not yet the long-term certainty of peace. Rain forest destruction is an even more complex and challenging issue, because it is closely interwoven with so many seemingly intractable problems—social, political and economic.

II

Discovering the reasons for the sudden dramatic acceleration in rain forest destruction is like slicing into a multilayered cake. On the surface, obvious factors include population growth; the increased need for land for agriculture, stock-raising and settlement; the wish to raise capital for development; and a rapidly growing demand for timber, fuelwood, and other forest products.

Yet when we look carefully we find that these are not necessarily decisive, or even important causes. Underneath are other layers—of social mores, of political expedients, of national and global economics, and of ideological conflict. Indeed today, almost everywhere, destroying rain forest is a means of *avoiding* tackling real problems by pursuing chimeras: a "license to print money" which yields quick cash at the cost of ultimate catastrophe. Each time we read of floods, landslides, starvation, and loss of life in India, Brazil, the Philippines, Haiti, East Africa, and elsewhere in the tropics, we are reading about problems caused or exacerbated by environmental destruction, often of rain forest.

One of the chimeras pursued by planners is the belief that if land can grow trees it can grow crops. Two thousand years ago most of Europe and China was sparsely inhabited and covered by thick forests. Today, in their place, lush farmlands support huge civilized populations, with only occasional patches of forest remaining. To the ignorant, and to wishful thinkers in less-developed countries, the felling of tropical rain forests marks the end of backwardness and the beginning of a similar process of enrichment. This is an understandable viewpoint. Indonesia, for example, has a total land area of 1.9 million square kilometers of which 60 percent is under dry-land forest, while tidal swamps (largely mangrove forest), heavily eroded hill slopes, and impoverished alang-alang grassland occupy another 30–45 percent, leaving a population of 152 million to live on a mere five to ten percent of her land surface.

At higher altitudes where the climate is cooler; where rainfall is seasonal (so that during part of the year nutrients are drawn up

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from below by evaporation and capillarity, instead of just being washed away); and in alluvial and volcanic areas of the rain forest zone, are found rich, permanently cultivable soils that are among the most fertile known. In central Java they support 1,500 persons per square kilometer; in the Mekong Delta, 350—the densest agricultural land populations anywhere. Unfortunately nearly all such rich soils have already been known for centuries, cleared of forest, and cultivated. Population maps show exactly where they are: alongside the crowded parts of Java are thinly settled regions; small, teeming Madura is next to vast unpeopled Borneo; the Andes valleys are thickly inhabited, while in the forests of Amazonia, alongside, the population density is about ten persons per square kilometer, or even less (two in adjacent formerly forested savannah areas).

According to the World Bank, less than ten percent of existing rain forests are growing on such rich soils.[6] It would be fortunate indeed if we knew their location. Then deliberate deforestation, large-scale settlement, cultivation and ranching could be confined to these approximately 1.16 million square kilometers. On the remaining 90 percent of tropical forest lands, a population of no more than about ten persons per square kilometer (i.e., about 100 million in all, worldwide) can live. They can practice shifting cultivation, together with a little small-scale hunting, logging, charcoal burning, and collecting of forest products. But any greater degree of exploitation, and any conversion to other uses, would cause permanent damage and loss of productivity to these lands—the eroded hill-slopes, the alang-alang grasslands (or their local equivalent), which already occupy huge formerly forested areas in Indonesia where the poor and hopeful have tried the experiment in the past. In a word: impoverishment, local and national, will result. And this is what is being created, accidentally or through misguided policies, as deforestation proceeds in many parts of the tropics.[7]

The nature of soil weathering under rain forest conditions was first brought home to me sharply some 35 years ago in a gold mine in the interior of Guyana: "We descended 300 feet by lift, and on our way I noticed that weathering of the solid rock had taken place down to 60 feet below the surface in this hot and humid climate, instead of at the most 2 or 3 feet, as in England. At this depth what looked like solid feldspar crystals were soft as butter, the granite

[6] John S. Spears, "Small Farmers—Or the Tropical Forest Ecosystem?", paper presented at International Forestry Symposium, Yale, 1980.

[7] Robert J.A. Goodland, *Amazon Jungle: Green Hell to Red Desert*, Oxford: Elsevier Press, 1975.

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itself merely clay containing sand grains."[8] Remove the tree cover, and on steep slopes heavy rain would sweep away those 60 feet of soil and perished rock in a few months, leaving gulleyed badlands.

Tropical forests are able to thrive on exceedingly poor soils because their plants have evolved ways of capturing and holding nearly all the nutrients that become available: tree roots are superficial, and sometimes actually rise above ground level to penetrate directly into fallen logs; while the fungi digesting dead leaves exchange nutrients with adjacent trees. Under rain forest conditions, as I saw in my descent down the mine shaft, silica is dissolved preferentially out of the underlying rock, and iron oxide, alumina, magnesia and other minerals accumulate—hence the bright red and yellow colors of tropical "lateritic" soils, which typically have adequate nitrogen but usually little calcium, potassium, and phosphorus. However, huge areas of tropical soils consist of almost pure silica to begin with, being the fossil sands of ancient seas; weathering leaves these white or pale colored, and very low in nitrogen.[9] In either case the nutrients are mainly in living or rotting material, and not in soil humus. When the forest is felled, decay is swift and nutrients are rapidly leached away by the torrential rains—as are any fertilizers applied.

In Malaysia, under such conditions, hill rice yields fall from 100 percent in year one, to 47 percent in year three; in Zaïre, from 100 percent to 24 percent in two years. Experimentally, various attempts to achieve continuous cultivation have been tried on forest soils with different degrees of success. For example, a multiple-cropping system which never leaves the surface bare works well in Indonesia, on the comparatively rich red and yellow podzolic soils which cover about 15 percent of the country's area, and which are mostly grassland, formerly forested. But this involves heavy and skillful applications of artificial fertilizers, and can only be used where prices for the crops produced will sustain their purchase.[10]

In general, on poorer forest soils the best—and indeed only—suitable farming methods are those that have been evolved almost uniformly throughout the tropics by tribal peoples. Typically they clear a patch of forest, cultivate it for two or three years; then move on, fell, clear and plant another area—the system known as slash-

[8] Nicholas Guppy, *A Young Man's Journey*, London: John Murray & Co., 1973, p. 167.

[9] Peter Grubb, lecture to the Cambridge Philosophical Society, 1983; John Proctor, "Mineral Nutrients in Tropical Forests," *Progress in Physical Geography*, Volume 7, No. 3, 1983; E.C.J. Mohr, F.A. van Baren, and J. van Schuylenborgh, *Tropical Soils: A Comprehensive Study of their Genesis*, The Hague, Paris, Djakarta: Mouton-Ichtiar Baru-Van Hoeve, 1972.

[10] Gordon R. Conway, Ibrahim Manwan and David S. McCauley, "The Development of Marginal Land in the Tropics," *Nature*, Vol. 304, August 4, 1983, p. 392.

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and-burn, or shifting cultivation. This might seem destructive, but the small fields are ecologically similar to natural gaps in the forest, which remains all around to recolonize them and restore fertility to the soil.

These natural gaps form part of the development cycle of rain forest, which consists of a mosaic of three phases, each with its own distinctive characteristics and plants.[11] If we are to learn how to utilize this ecosystem for our own ends, we must understand how the processes of destruction and re-creation operate in these phases.

In the Gap phase, which occurs when a tree falls, there is negative productivity as the tree decomposes. This is followed by the Building phase, during which productivity is higher, these two phases occupying about ten percent each of any given undisturbed area. Finally, the Mature phase is reached, typically occupying about 80 percent of the total area, in which productivity levels off and remains low for many years until trees die and create new gaps. This Mature phase is what most people envisage as typical rain forest; it occupies most of the area most of the time, and though lower than the Building phase in "biomass" productivity (net dry weight or volume of trunks, branches, roots, leaves, etc. produced), qualitatively it has far more species and materials, and provides the greatest environmental protection.

The overall productivity of rain forest (including all of these phases) has not been convincingly estimated for any large area, but figures as low as 3.5 and up to 28–32 tonnes per hectare per year have been found.[12] In Venezuela, Peter Grubb made accurate measurements in several kinds of natural forest growing on rather poor soils, and found a total above-ground biomass productivity per year from 10.5 to more than 16 tonnes per hectare. After clearing, when fertility was greatest, manioc yielded a mere 1.8 tonnes.[13] But manioc is directly usable by man, and at present much of forest biomass is not, however valuable it may ultimately prove.

When a natural gap occurs, or a slash-and-burn field is abandoned (or an area clear-felled), the first new plants of the Building phase to appear are herbs, vines, and the seedlings of trees which produce abundant light and often wind-blown seed. Efficient colonizers, these are often regarded as "weeds," and are found only in gaps or at riversides, because typically they are "light-demanders," intol-

[11] T.C. Whitmore, *Tropical Rain Forests of the Far East*, Oxford: Clarendon Press, 1975; new edition 1984.

[12] Carl F. Jordan, "A World Pattern in Plant Energetics," *American Scientist*, Vol. 59, 1971, pp. 425–433.

[13] Peter Grubb, *op. cit.*

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erant of shade (or they would already be thriving under the forest), and very fast growing. Soon the larger species begin to push through this tangle—commonly trees of genera such as *Cecropia*, *Ochroma* ("Balsa"), *Musanga*, *Macaranga* and *Trema* in different parts of the tropics—in stands often of a single species. Within 7–15 years they form a pioneer forest with a closed canopy up to 12–16 meters high.

Under this canopy, shade-tolerant slower-growing species with heavier wood begin to appear, usually derived from larger seeds with abundant food reserves. Such seeds and their seedlings have a long life, but are often slowly dispersed—they may only be capable of spreading a few feet every hundred years. In about 50–80 years they consolidate to form high "second growth," perhaps 25 meters tall, containing a much larger mixture of trees with medium or heavy woods.

So long as their seedlings or seeds are present (or arrive), trees of the original Mature-phase rain forest will also begin to appear, as conditions for them become suitable, and eventually these overtop the "second growth" and form a closed canopy 40–55 meters above ground. After 150 years most of the large trees of the regrown area will be those of the Mature phase, but it may take up to 400 years before all the original components have reassembled: the smaller trees of lower layers, the shrubs, herbs, lianes and epiphytes, and the vast and varied fauna of mammals, birds, reptiles, insects, mollusks, and other forms of life. The final stages of reassembly are the slowest, because as this complex society develops, fewer and fewer opportunities, or "niches," are left—and there must be Mature-phase forest close by from which they can be recolonized. To retain rain forest, therefore, we must treat it with respect, for each area of the world has its unique constituents; once lost, they are gone forever; and even if not lost, take hundreds of years to reassemble.

Accurate analysis of these stages, and of their accompanying soil and microclimate changes, and of the roles of the different species in them, is lacking. It should enable us one day to modify this mosaic to our greater advantage, without the current destructiveness, and possibly increase the population that forest areas can carry. Often trees of the Building phase have lighter, more workable wood than those of the Mature-phase forest, and as they grow faster these are the species usually selected for growth in plantations—and sometimes described as "miracle" trees: Gmelina will grow to a size suitable for harvesting in 7–12 years; Caribbean Pine or Eucalyptus in 15–25 years; teak in 60–80 years, *once*. But fast

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growth depletes soil nutrients and moisture, and affects soil structure, and growing a second or third crop on the same site becomes agriculture, with fertilizers necessary as yields drop dramatically.[14] In converting rain forest to agriculture, tree or shrub crops (such as citrus, bananas, mangoes, coffee, cacao, oil palm, rubber, etc.), tree plantations, ranching, or even the various mixtures of agriculture and forestry known as "agroforestry," we are in effect trying to isolate the Building phase and take advantage of its superior productivity; and this we cannot do sustainably on the poorer soils. And this is only to be expected, for their rain forests have evolved to utilize the natural inputs of these sites through thousands of years of optimization.

If, after felling, there is a "forest fallow" period during which the field or gap is allowed to regrow as natural forest to the Mature phase, no permanent damage is done. But where recultivation is more rapid, and the forest that returns never gets beyond the Building phase, there is immediate loss of soil nutrient status, of diversity and of environmental benefits. Nor is there any guarantee that these can be recovered. And if the frequency of clearing and cultivation is further increased, usually because of population pressure, the forest simplifies yet more, until a scrub of "weed" species or impenetrable tall grass takes over, and soil drying and degeneration are swift. Burnings hasten the process, and desert can be the end result. In Indonesia alone over 15 million hectares are covered with *Imperata cylindrica* grasslands, while in Java and Bali 40 million hectares are badly eroded, all as a result of deforestation. Throughout the tropics such wastelands are spreading, and they will continue to spread so long as the developmental sequences which bind together soil, landscape and plant life are ignored.

III

Land hunger is often proposed as a major cause of deforestation. Indeed, over half the world's population lives within the rain forest zone, in areas formerly forested (Table II), and still relies in part upon forest products, most importantly for fuelwood (half of all wood cut; four fifths of that cut in the developing world). The majority are materially very poor by Western standards, but seldom starving or destitute. The 420 million malnourished absolute poor[15] live mostly in low rainfall, poor soil, scrub and semi-desert areas of

[14] E.D. Chijioke, "Impact on Soils of Fast Growing Species in Lowland Humid Tropics," Technical Paper (Forestry), No. 21, Rome: FAO, 1980.
[15] "Agriculture Towards 2000," Rome: FAO, 1979.

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TABLE II

POPULATIONS OF THE WORLD'S PRINCIPAL TROPICAL FOREST COUNTRIES

Country	*Population*	*Annual Increase*	*In 2000*	*Per Capita GNP (U.S.$)*
Brazil	123,030,000	2.3%	187,494,000	1,770
Indonesia	151,891,000	2.3%	198,687,000	370
Zaïre	28,290,000	2.7%	49,982,000	210
Peru	17,780,000	2.7%	30,703,000	850
Colombia	27,520,000	2.3%	37,999,000	1,060
India	683,810,000	2.1%	960,611,000	210
Bolivia	5,600,000	2.6%	9,724,000	550
Papua New Guinea	3,080,000	2.3%	5,179,000	760
Venezuela	13,910,000	3.4%	27,207,000	3,440
Burma	36,170,000	2.2%	55,108,000	150
Total	1,091,081,000		1,562,694,000	
Total World Population	4,735,000,000		6,118,850,000	

SOURCES: International Monetary Fund, *International Financial Statistics Yearbook 1982*, Washington, 1982; United Nations, *World Population Problems as Assessed in 1980*, New York, 1981; World Bank, *Atlas of Gross National Product, Population, and Growth Rates*, Washington 1981; Norman Myers, *Conversion of Tropical Moist Forests*, Washington: National Academy of Sciences, 1980; John Paxton, ed., *The Statesman's Yearbook, 1983–84*, London: Macmillan, 1983.

Africa, Asia and South America—areas which in several instances have been forested historically.

Within the rain forest itself live some 696 million people,[16] who are dependent upon the forest entirely for their livelihoods. They are not evenly distributed, living mostly round the edges of the main forest areas. In regions with low agricultural populations (less than one person per ten hectares of trees), such as Papua New Guinea, Central Amazonia and the Guianas, central and southern tropical Africa, and the Caribbean Community countries, the forest is least under pressure; in those where agricultural populations average more than one person per two hectares of tree area, such as tropical Asia, Central America, and the savannah fringe areas of West, Central and East Africa, the threat is greatest.

Some of these people belong to forest-dwelling tribes, but the majority are encroaching settlers, and it is commonly said that these are the chief cause of rain forest destruction. But this is not so, for between half and two-thirds of them live in already damaged "Second Growth" or logged forest, because undisturbed rain forest is seldom accessible except where it has been opened up by logging roads. Nonetheless their destructive impact is great, because they

[16] Estimated from Lanly, *op. cit.*, pp. 34–55.

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shorten the forest-fallow period, and as they advance they convert productive areas to scrub and grassland. These encroachers have a low population growth rate (1.58 percent per annum) compared with the average for their countries (2.6 percent).[17] By 2000 they will have increased to some 925 million, while new settlers will raise the overall total yet further—unless government policies in several nations are reversed. If uncontrolled they will occupy half of the total forest area that exists today.

John S. Spears examined this problem and concluded that 200 million of these people (40 million families) could be permanently settled on 1.3 million square kilometers of better forest land (giving about 1.5 hectares per person) at a cost of between $5,000 to $20,000 per family, or about 50 times the average encroacher's annual cash income—his costs being based upon those of actual World Bank agricultural settlement schemes.[18] The total cost of Spears' scheme is thus $200 to $800 billion, while a scheme to settle all forest encroachers by A.D. 2000 would cost $700 to $2,790 billion, or between $40 and $165 billion a year. Spears concludes that "dependent on the situation, investment of the same amount of money in improving agricultural productivity outside the forest areas may well benefit more people at lower cost."

It is here that we begin to slice deeper into the multi-layered cake of deforestation causes. For though much forest colonization is spontaneous, more often it proceeds with government encouragement, as it provides a convenient safety valve for land hunger and social discontent. Almost none of it, however, is occasioned by a genuine shortage of new land.[19]

In Brazil, for example, outside of Amazonia—the area drained by the River Amazon and its tributaries—there is enough good, permanently cultivable land to give 2.3 acres to each individual Brazilian, and ten acres to each family—more such land than is available in the United States. Yet as a result of government policies disadvantageous to small farmers, smallholders are selling up and moving elsewhere (in Paraná state 40 percent of the smallholders of just one municipality left in 1982).[20] Fifty percent of farmers today own only three percent of farmland, while 43 percent of farmland is owned by one percent of farmers. Many of the larger holdings of de-peopled high quality farmland, which are mostly in

[17] Lanly, *op. cit.*

[18] Spears *op. cit.*; and "Can the Wet Tropical Forest Survive?", *Commonwealth Forestry Review*, Vol. 57, No. 3, 1979, pp. 1–16.

[19] Val Plumwood and Richard Routley, "World Rainforest Destruction—The Social Factors," *The Ecologist*, Vol. 12, No. 1, 1982, pp. 4–22.

[20] Adrian Cowell, "The Decade of Destruction," Central Television, Manchester (U.K.), 1983.

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southern Brazil, are today underused, or even unused, being held for investment by corporations and absentee landlords whose main business is elsewhere. And ironically large tracts of this farmland are now being commercially reforested. Brazil thus has a real problem of land hunger in the midst of plenty.

To meet this self-inflicted need, the rain forests of Amazonia in the north of the country were opened to colonization in the 1960s; the vast Amazonian basin, which includes some 40 percent of Brazil's national area, is mostly heavy forest, though there are some areas of relatively thin forest and savannah (prairie). The "New Frontier" was promoted in a fever of nationalist enthusiasm. "E Brasil Gigante" read the t-shirts: Amazonia must be peopled with good Brazilians, not just Indians—to whom, under Brazil's laws, most of the land belongs. Where not deliberately murdered or evicted, measles and other introduced diseases have killed up to 100 percent of the Indians contacted in this process, and time and again Indian reservations and park boundaries have been altered.[21] Amazonia must be traversed by roads to provide infrastructure and facilitate settlement, but also "for easier defense against invasion," a general told me in 1972 (as if unbroken forest is not a better defense?), "and against insurgents." Highway construction was started in 1968, and funded in large part by outside agencies: the U.S. Department of State, the U.S. Agency for International Development, the Inter-American Development Bank, the World Bank, and direct U.S. Army aid to the Brazilian Army Corps of Engineers.

Between 1966 and 1975, 11.5 million hectares of forest were cleared. Small parcels of forested land were (and still are) given free to settlers, while larger areas of 2,000 hectares or more of better land could be bought for around five dollars (today, $20 to $35) per hectare. Wave after wave of immigrants arrived, enticed by hopes of a new life on their own property.[22] Most failed because of the poor soil (only two percent of Amazonia's soils are perma-

[21] Shelton Davis, *Victims of the Miracle*, Cambridge, 1977; Nicholas Guppy, "Some Crucial Issues of Our Time," *Environmental Conservation*, Vol. 7, No. 1, 1980, pp. 3–8; Robin Hanbury-Tenison, *A Question of Survival for the Indians of Brazil*, London: Angus and Robinson, 1973; Norman Lewis, "Genocide," *The Sunday Times Magazine*, London, February 23, 1969; World Bank, "Tribal Peoples and Economic Development: Human Ecological Considerations," Washington: World Bank, 1982. Discussion of current aspects of this issue can be found in *Cultural Survival Quarterly*, published by Cultural Survival Ltd., Cambridge (Mass.), and *Survival International News*, published by Survival International Ltd., London.

[22] George Martine, "Recent Colonisation Experiences in Brazil: Expectations Versus Reality," in *Land, People and Planning in Contemporary Amazonia*, ed. F. Barbira-Scazzocchio, Cambridge (U.K.), 1980; Samuel Benchimol, "Population Changes in the Brazilian Amazon," contribution to *Change in the Amazon Basin*, symposium of the 44th International Congress of Americanists, Manchester (U.K.), 1982; Davis, *op. cit.*

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nently cultivable), and many ended up as laborers on the ranches that mushroomed. For at such low land prices it was profitable for larger-scale investors to buy land, often in big blocks, clear-fell, sell the few trees worth the trouble of extracting, and burn the rest; then sow grass and bring in cattle, despite the fact that the land proved able to sustain only about one head per 2.5 hectares on average, and that the average life of each ranch is a mere two to seven years before it has to be abandoned due to weed growth, erosion, and loss of nutrients.[23] During the ten years to 1975, peasant colonization over the whole of Amazonia cleared some two million hectares—less than half the amount of forest obliterated by ranching in one state alone in three years. Sixty percent of clearance was done by highway developers (3,075,000 hectares) and cattle ranchers (3,865,271 hectares), and only 17.6 percent by peasants. Today Amazonia still contains only four percent of Brazil's population; there is abundant cheap labor on the surviving ranches, and in retrospect the colonization scheme looks almost like a costly and destructive Machiavellian plot to procure it!

By 1976 failure was apparent in central Amazonia. Government settlement planning then focused on the seasonal forests of Rondônia, in the southwest of the region, where the old pattern is repeating itself in unabated stupidity. Colonists are given 50 hectares each, laid out in grid patterns with no regard for soil quality (much is unfarmable), availability of water, topography, or the legal rights of its Indian and Caboclo (existing forest peasant) inhabitants. By 1983, 70,000 settlers a year were arriving, and 80,000–90,000 are expected this year, lured by the offer of free land, government-guaranteed minimum prices for crops, and title-deeds—granted only after a percentage of land has been cleared of forest.[24]

Already, as in all other deliberately colonized parts of the Amazon Basin, immense and irreversible environmental damage has been caused, involving a vast reduction in capital resources, and of potential income. Brazil imports two thirds of its rubber, but could be self-sufficient from the forests being felled and burnt (rubber-tappers earn as much as the best-paid factory workers); fish which breed in the forests when they are flooded produce more protein per hectare than cattle; and wild produce such as Brazil nuts are more valuable than the settlers' crops. Even more remarkable, Rondônia imports nearly all its fuel, including gas for cooking,

[23] Harald Sioli, "The Effects of Deforestation in Amazonia," contribution to *Change in the Amazon Basin*, *op. cit.*; Stephen G. Buner, "Forces of Destruction in Amazonia," *Environment*, Vol. 22, No. 7, September 1980, p. 39.

[24] Adrian Cowell, *op. cit.* footnote 20.

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while its forests, covering an area the size of West Germany, go up in smoke! Despite all the incentives and the money poured in (estimated at $12,000 per settler), no sustained output adequate to service investment in the region has arisen, and Amazonia produces only two percent of Brazil's gross domestic product.[25] Yet deforestation is accelerating, exponentially and unstoppably (unless road-building ceases), at a rate that will clear Rondônia by 1990 and the whole of Amazonia by 2000.[26]

But why was Amazonia chosen for settlement at all, when there are almost equally huge areas of undeveloped "campo" (prairies) far better suited for colonization, ranching and agriculture? The advantages of campo over rain forest were pointed out early on by many experts, including one of the World Bank's ecologists.[27] Did the forest have to be conquered out of *machismo*, for reasons of "conspicuous consumption"[28] or consumerism gone mad, to secure votes (as when Rondônia was created a state, title deeds being "bribes"), because forest represents "backwardness" (instead of an immense asset) in the Brazilian subconscious? Or—in mountaineering terms—simply "because it was there"? All these explanations have been given, and national motivation is certainly hard for outsiders to understand. A very few investors, a few multinationals, and the highway developers made money. Brazil as a whole has lost heavily; and as a result of this and other unfortunate political and financial decisions its external debt today is the largest of any country—$94.9 billion at the end of 1983.

A similar enormous forest colonization program is now under way in Indonesia, where political pressures are even greater than in Brazil. There is a diversity of peoples and religions, and there have been a number of separatist rebellions. In overcrowded Java one percent of farmers own 35 percent of agricultural land, and their large farms are less productive than smallholdings. Half of the smallholders have less than a half-hectare of land each, and half of all rural households own no land at all.[29] So millions of land-hungry but politically reliable Javanese are being "transmigrated," mainly to Sumatra, Kalimantan (Indonesian Borneo), Sulawesi, and West Irian. Four million are being settled in Kalimantan alone, at a cost of over $1,000 per hectare.

[25] Robert Skillings, "Economic Development of the Amazon—Opportunities and Constraints," contribution to *Change in the Amazon Basin*, *op. cit.*

[26] Philip M. Fearnside, "Deforestation in the Brazilian Amazon: How Fast is it Occurring?", *Interciencia*, Volume 7, No. 2, 1982, pp. 82–88.

[27] Goodland, *op. cit.*

[28] Thorstein Veblen, "Theory of the Leisured Class," 1899.

[29] Plumwood and Routley, *loc. cit.* footnote 19.

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Despite the poverty of its soils (less than two percent are believed to be permanently cultivable), Kalimantan's forests are biologically unusually rich in species, and economically exceptionally valuable. Whereas those of Brazil have largely been burned, Kalimantan's are being sold (though correspondents report immense areas felled in advance of extraction, and left rotting). Transmigration and logging come under separate ministries; but the combined plan seems to be to clear these forests completely, using some of the logging profits to finance the Transmigration Program. Roads are laid out so as to penetrate remote areas and improve control over the indigenous inhabitants, lest they be disaffected—as well they may be, for most of the land is already owned under traditional law, largely ignored in the granting of concessions.

Concession agreements are for 20 years only, so the concessionaires, though frequently aware of the importance of conservation, have no option but to cut their lands as rapidly as possible, and no incentives to replant for someone else's benefit. Logging has been proceeding at the rate of over 800,000 hectares a year, while shifting cultivators following behind cut about 200,000 hectares of mostly previously logged and damaged or secondary forest. Extrapolating current clearing rates, there will be no trace of these forests left in 13 years.[30] As a result of the denuding of the Barito and Kahayan river catchment areas, floods in 1977 and 1979 destroyed the ricefields of 10,000 farmers, while a further 10,000 people were put out of work through the loss of forests from which they obtained ironwood for shingle making.[31] Visiting such areas it is hard to view without emotion the miles of devastated trees, of felled, broken and burned trunks, of branches, mud, and bark crisscrossed with tractor trails—especially when one realizes that in most cases nothing of comparable value will grow again on the area. Such sights are reminiscent of photographs of Hiroshima, and Brazil and Indonesia might be regarded as waging the equivalent of thermonuclear war upon their own territories.

Major concessionaires have included Georgia Pacific and Weyerhauser (1.5 million acres). Weyerhauser (International Timber Corporation of Indonesia) had as its local partner an Indonesian company, owned by a foundation created by President Suharto to maintain the loyalty of 73 generals, who were given money by Weyerhauser with which to buy their shares and who shared 35

[30] Alan Grainger, Rain forest monitoring, Oxford University, personal communication.

[31] George Y. Adicondro, "The Jungles are Awakening," *Kogai*, No. 22, p. 61, Tokyo, 1979, quoted in Plumwood and Routley, *loc. cit.* footnote 19.

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percent of the profits.[32] Some 80 concessionaires, including Weyerhauser, have reportedly now closed their Indonesian operations because of excessive demands made on them locally, including requirements to set up local timber-processing plants surplus to world market requirements.[33] Their place is being taken by local Chinese business interests, who already control over 75 percent of Indonesia's economy, and who will now decide the fate of Indonesia's forests.[34]

Indonesia's Transmigration Program is larger than Brazil's, and equally destructive of capital, of the environment, and of the societies involved. Despite these facts, because Indonesia has oil wealth and her forests are highly salable, it will continue longer, largely because "Javanization" of the outer islands is desired by the central government (whatever their local inhabitants may feel). Even so, the marks of failure are apparent: foreign debts now total $26.2 billion, and are growing; and the Program, like the lesser schemes of other rain forest countries, could not exist or continue without outside funding.

IV

If population growth and land-hunger form the top layer of the deforestation cake, and social conditions (under which suitable land is not available) form the second layer, then local political motivations and unwillingness to face realities form the third. Beneath this, the fourth layer of the cake is the ready availability of funding.

In 1976 lending to all developing countries totaled $75 billion. Since then the huge flows of money created by OPEC (rising oil prices), the printing of money (inflation), and savings have been lent by commercial banks (U.S. banks alone lent $300 billion) to governments, without adequate safeguards such as collectible collateral or the built-in supervision that characterizes ordinary lending.[35] As a result, today eight countries each owe more than $20 billion (including four of the largest rain forest countries), while

[32] Rachel Grossman and Lenny Siegel, "Weyerhauser in Indonesia," *Pacific Research*, Vol. 9, No. 7, 1977, p. 5, quoted in Plumwood & Routley, *op. cit.*

[33] Personal communications, 1983.

[34] There have been reports of timber royalties being diverted away from tribal landowners, and of other examples of corruption. Over $40 million (in the Sumitomo Bank, Singapore) is currently being claimed by the former employers of Hadji Achmad Thahir, an Indonesian official; and his widow has given "names at the very top of the Suharto Government whom she said were parties to the illegal payments . . . in support of her case that bribery is part of the system in Indonesia and that there was nothing untoward in her husband's dealings." See David Watts, "Indonesian Oil Bribes Case held in Camera," *The Times*, London, September 20, 1983.

[35] See, for example, Anthony Sampson, *The Money Lenders—Bankers in a Dangerous World*, London: Hodder & Stoughton, 1981.

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Brazil ($94.9 billion) and Mexico ($91 billion) each owes more than the world total of a mere seven years ago; and the current world total has risen to around $400 billion.[36]

The result of this enormous expansion of credit and of investment was at first unprecedented economic growth, operating smoothly within the framework of free trade provided by the General Agreement on Tariffs and Trade. But unfortunately much of this growth has proved artificial. Instead of solving problems, it has worsened them, for reasons that lie not with the concept of aid, but with the method of lending. This is particularly apparent with the rain forest countries, which typically have non-democratic governments that are hard to change, poor or bad civil-rights records,[37] low per capita gross national product (GNP), frequently few cashable national assets—and high population growth rates and sometimes high populations (as shown in Table II above). Such countries have proved peculiarly vulnerable when given large sums of money. Even though the loans and investments themselves are "paved with good intentions," a clear sequence of causes and effects has frequently and cumulatively led to most undesired consequences:

—In general, loans have been made to governments, and major investments channelled through them, instead of to individuals, banks and businesses.
—This has strengthened governments, through whom the resulting funds flow.
—This has caused planning to become centralized, bureaucracies to burgeon, and an emphasis on grandiose schemes—power stations, dams, road networks, forest colonization: a disease that might be called "infrastructuritis."
—A wealthy elite is created around the government.
—This elite has little to spend its wealth on in a poor country—except land, which passes increasingly into fewer hands, and imported consumer durables such as cars, and technology. The elite becomes isolated from the rest of the country.
—Corruption grows.
—The import of technology is often tied in with the loan or investment agreements, and the use of this technology creates a second elite of technicians, including the armed forces and those involved in development projects.
—Unemployment grows, as land tenure and traditional rights and forms of employment change.

[36] Anonymous, "The Banker's Guide to LDC Debt," *The Banker*, London, January 1983, pp. 82–83.
[37] See Charles Humana, *World Human Rights Guide*, London: Hutchinson, 1983.

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—To service the loans, or in agreement with their terms, the focus of economic activity moves away from self-sufficiency toward exporting (in 1950 Africa as a whole was self-sufficient in food; in 1978 it imported 12 million tonnes of cereals; in 1990 it will need 45 million tonnes, one third for Nigeria).
—As this happens, widespread long-term benefits for the many are replaced by short-term benefits for the few, while wealth is increasingly transferred from the poor to the rich, the gulf between whom widens.
—Forests are regarded as potential shelter for dissidents, and are cleared for security reasons.
—Due to bad planning (often based on imported models) adequate economic returns fail to materialize.
—Loan interest and repayments fall in arrears, and have to be rescheduled to avoid default.
—Environmental destruction increases, as capital resources such as forests and minerals are cashed in, in an effort to remain solvent.

Finally, if the nation is a democracy it will have changed its government and its policies long before this sequence runs its full course. Otherwise autocracy grows and spending on the armed forces increases. In any event, poverty and discontent grow, and dissidents, in their ignorance, may turn to the Eastern bloc for help.

All of this picture may not be true all of the time, but some of it is true much of the time. Unfortunately, no successful way of changing the sequence from outside has been proved, for withholding aid commonly leads to a threat either of default, or of Eastern bloc aid replacing Western. (If this last happens—officially, or unofficially to dissidents—then civil war of one sort or another is likely to break out.) The most promising steps could be taken by the banks and the International Monetary Fund, through decisions actively to support democratic institutions wherever they exist, and to encourage their development where they do not; and to try to change the form of loaning, so as to lend only against security, and at the broadest accessible level of individuals and small-scale projects, perhaps through specially set-up development banks, leaving the large-scale projects to fund themselves in their own proper time.

This would foster the growth of wealth from below. Until this happens the social causes of rain forest destruction will continue to worsen, and internal opposition to it will be stifled. The power-hunger, fear and greed that exist under repressive military governments are often the major threats to the environment; and internal movements concerned with conservation, reforestation and social

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issues cannot develop so long as such autocratic regimes are supported by existing funding methods.

V

Rain forests are the only major asset of several poor tropical countries. How best can they use them to raise their living standards, without falling into the "development sequence" trap detailed above? The short answer is to get the full value, though how to do this may not be immediately apparent.

Ecologists describe Mature-phase rain forest as having several (often ill-defined) "strata," the most obvious being the top layer of tall trees whose crowns form a continuous canopy, usually between 40–55 meters above the ground. Protruding through this are occasionally even taller trees, called emergents; while below it are layers of smaller trees which can tolerate shade, whose crowns pack together at say 25, 15, and 6 meters. Some of these may be saplings waiting to push through to the upper layers; but most are probably true understory trees that never get any taller. A large rain forest may contain as many as 1,800–2,300 species of trees (Sarawak and Brunei)[38] as against the mere 7–15 in a temperate forest; there may be as many as 400 larger kinds in a single hectare, many of them only occurring once.

Below them there is sometimes a layer of shrubs, and below that one of herbs, depending upon how much light penetrates downwards. Scrambling through and over all these layers are numerous climbing plants, sometimes hundreds of feet long; while upon the branches of the trees, and even upon their twigs and leaves, sit yet smaller plants—epiphytes and epiphylls: orchids and bromeliads, algae, mosses, liverworts, ferns, horsetails, selaginellas and lycopodiums. Animal life of every kind—multitudes of mammals, birds, reptiles, amphibians, fishes, mollusks, worms, spiders, insects and other invertebrate creatures—live in, on and among this vegetation, and are interdependent with it, and this complexity continues below ground level. This huge concatenation of species has evolved together to take advantage of every available input of the environment, to utilize carbon dioxide and catch sunbeams and water, water vapor and minerals at a primitive level; and at increasingly sophisticated levels, by means of an elaboration of chemistry and of behavior that is unmatched anywhere else, to defend and enlarge its roles. Building-phase forest, or plantations of uniform species,

[38] Whitmore, *op. cit.* footnote 11.

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have far less complexity, and in consequence less ability to use and control the environment.

It is obvious that we understand and exploit but a microscopic fraction of the potential of all these riches—the treasure trove of genetic material that is irreplaceably lost when rain forest is destroyed, for almost every area has something unique. Several million rain forest species, mainly of invertebrates, have not even been seen or described by scientists. Fewer than 200 species of edible plant are used commercially, while 16 provide 90 percent of the world's food.[39] Yet over 80,000 are already known, mostly from rain forests, and none of them yet cultivated. And beside food plants and animals, the forests contain medicinal species, species with varied industrial uses, species used in making clothing, cosmetics, and for hundreds of other purposes. It will be many years, possibly centuries, before we can do justice to all this material—if it survives.[40]

Meanwhile, what we are selling is not the wealth of the forest, or its environmental benefits, but just timber. Only 15–20 tropical woods are of international market importance, and to extract these it is worth making roads into the forest, or even lifting out by helicopter. Even in the rare cases where we have expert foresters who can recognize in the field all 400 different kinds of large tree, at today's prices it is uneconomic to sort out any but the most valuable into end-use classes. The very plethora of varieties is an embarrassment when demand in the timber trade is for standard raw materials with which to make uniform products at the cheapest possible price. Clearly, natural rain forests are intrinsically not well suited for industrial use—for sawmilling, plywood, paper and pulp production, or making woodbased panels; trees grown in monocultural (single species) plantations are far better, being uniform in size and quality. Approximate uniformity is sometimes achieved by chipping all the trees of the forest, and compressing with adhesives to make artificial board. Mostly it is cheaper to ignore the majority, even though many are excellent woods used locally, and have potential for development and export. In a few years' time, as supplies of tropical timbers fall below demand, their monetary value

[39] S.G. Harrison, G.B. Masefield, and Michael Wallis, *The Oxford Book of Food Plants*, Oxford: Oxford University Press, 1973.

[40] For discussions of this issue see Professor J. Heslop-Harrison, "Genetic Resource Conservation: The End and the Means," *Journal of the Royal Society of Arts*, London, February 1974, pp. 157–169; Ghillean Prance, "The Increased Importance of Ethnobotany and Underexploited Plants in a Changing Amazon," contribution to *Change in the Amazon Basin*, *op. cit.* footnote 22; Ira Rubinoff, "Tropical Forests: Can we afford not to give them a Future?", *The Ecologist*, Vol. 12, No. 6, 1982, pp. 253–258; Norman Myers, *The Sinking Ark*, Oxford: Pergamon Press, 1979.

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will rise, and they will be harvested and processed with care; currently they are too cheap often even to leave growing when the forest is logged.

Frequently 90–98 percent of trees are left unused when an area of rain forest is logged. If exploited non-mechanically, a logged forest may appear scarcely affected, but with mechanization felling is more destructive, and tractor extraction packs and disturbs the soil so that natural regeneration is reduced. Where ten percent of the trees are extracted, around 55 percent are usually irreparably damaged, and 35 percent left standing.[41] Of a total rain forest standing volume of 200–350 cubic meters of timber per hectare (up to 500 is known) only between 5–30 cubic meters are generally used in the lumber industry, three to six cubic meters for export.

In Southeast Asia extensive forests exist of trees of the family *Dipterocarpaceae*, which have similar wood, making these forests commercially more valuable than the generally more mixed forests of Africa or Latin America. Because Dipterocarps set seed simultaneously every few years, it is possible to fell such forests at the right time, and they will regrow little harmed. But although this is widely known, in the rush for quick cash it is ignored, and throughout the Philippines, Malaysia, and now Indonesia these forests are being substantially logged out of existence.

During the period 1950–1980 Nigeria became an importer instead of an exporter of timber, and the forests of Ghana, Thailand and several other countries were depleted to the point where they could no longer supply even local demand (today Thailand imports $44 million of wood per annum); in Central America, between 1961 and 1978, 39 percent of the forests were felled and the land converted to cattle ranching.[42] In the Philippines, log exports declined after 1976 to one quarter of the previous level, after the almost complete removal of all accessible lowland forests—with resultant annual severe floods, landslides and loss of life. In Brazil, felling for fuel to stoke iron smelters, along with other activity, has reduced the remarkable and once extensive Atlantic rain forests (home of unique primates) to a few tiny patches.[43] Along the forest

[41] P.F. Burgess, "Effect of Logging on Hill Dipterocarp Forest," *Malayan Nat. Journal*, Vol. 24, 1971, pp. 231–70, cited in Whitmore, *op. cit.* footnote 11.

[42] While Amazonian beef is sold mostly for home consumption, Central American is largely exported to the United States, where production costs are four times as great, for processing into hamburgers and frankfurters. Myers proposes that this trade has arisen because, faced by steep domestic beef price rises, the U.S. government has repeatedly increased beef imports as a simple means of reducing the retail price index by one point—in so doing unwittingly financing large-scale deforestation. Norman Myers, "The Hamburger Connection: How Central America's Forests Become North America's Hamburgers," *Ambio*, Vol. 10, No. 1, 1981, pp. 3–8.

[43] John Hatton, University College, London—personal communication, May 1983.

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margins of Central and East Africa an exponential decline in firewood yields is forcing the growing populations to eat uncooked food. In Nepal "landslides and catastrophic floods are becoming annual disasters."[44]

Starting in the 1950s, commercial logging (sponsored by the Indian government) reduced forest cover in the Himalayan foothills by 40 percent and has led to irrigation works in Uttar Pradesh being choked (six billion tonnes of topsoil are washed away each year), while in Bengal and Bangladesh thousands have died from floods, and huge areas of ricefields have been destroyed (in protest, the Chipko movement has arisen, whose members hug trees to prevent them being felled).[45] And deforestation is still increasing—both in countries like the above where there is population pressure, and in sparsely peopled nations such as Papua New Guinea, Solomon Islands, Zaïre and Gabon, in all of which large-scale logging contracts have been awarded as a part of export-oriented development programs (only in the Solomons is reforestation on a commensurate scale).

VI

The FAO has summarized the consumption of tropical hardwoods for all uses (including fuel) during the period from 1950 to 1980, and made projections of estimated consumption in 2000, with the results shown below.

TABLE III

CONSUMPTION OF TROPICAL TIMBERS IN 1950 AND 1980 AND ESTIMATED CONSUMPTION IN 2000

(in millions of cubic meters)

Countries	*1950*	*1980*	*Increase*	*2000*	*Increase*
Japan	1.5	35	2233%	48	37.1%
United States	0.8	10	1150%	20	100.0%
Europe	1.9	21	1005%	35	66.6%
Other importers	1.0	13	1200%	23	76.9%
Subtotal	5.2	79	1419%	126	59.5%
Producer countries	21.0	66	214%	185	180.0%
Total	26.2	145	453%	311	114.0%

SOURCE: FAO, "Agriculture: Towards 2000," Rome, 1980.

[44] Barney, *op. cit.* footnote 3, p. 321.
[45] S.K. Chauhan, "Tree Huggers Save Forests," *Development Forum*, Volume 6, No. 8, 1978, p. 6.

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These figures show that during the 30 years between 1950 and 1980, consumption of tropical hardwoods rose far above the increase in living standards of the importing countries. In the industrial nations, consumption was over twice that of all the tropical producer nations combined, despite the producers' far greater populations. The reason was the cheapness of tropical timbers compared with other materials, combined with their ready availability due to the policies of the producers, which often amounted to deliberate (or at best uncontrolled) asset-stripping. Between 1980 and 2000, growth in consumption is still estimated far to exceed economic growth, though to a lesser degree.

If present trends continue, by 2000 world timber stocks per capita will have fallen from 142 cubic meters to 114 cubic meters (i.e., by 28 cubic meters) in developed countries; and from 57 cubic meters to 21 cubic meters (by 36 cubic meters) in less-developed countries. There will be severe shortages of every kind of forest product, prices will be accelerating upward, and the sources of tropical timbers will have changed as present suppliers are depleted. The prospect is shown below:

TABLE IV

SOURCES OF TROPICAL TIMBERS IN 1950, 1980 AND 2000
(in millions of cubic meters)

Source Region	*1950*	*% of Exports*	*1980*	*% of Exports*	*2000*	*% of Exports*
Africa	4.7	32%	20	60%	35	29%
Latin America	15.5	5%	32	13%	118	24%
Asia and Pacific	14.3	14%	93	70%	158	80%
Total	34.5	17%	145	47.6%	311	44.3%

SOURCE: FAO, "Agriculture Towards 2000," Rome, 1980.

Globally, the World Bank estimates that an extra 500–600 million cubic meters per annum of industrial woods will be needed in 2000, plus an extra 200–900 million cubic meters of fuel woods. They predict that by then this extra supply will only be obtainable from the remoter parts of Amazonia and Siberia, from the utilization of lower quality North American hardwoods, and from plantations of faster growing tropical trees, if they are created in time. Reforestation for industrial needs will have to be doubled, and for fuel woods increased five times, if essential needs are to be met. The cost of such a program would be between $1.5 to $2.4 billion per annum, of which the World Bank proposed to supply 25–30 per-

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cent.[46] FAO projections of needs are even more pessimistic, as shown below:

TABLE V

WORLD DEMAND FOR FOREST PRODUCTS IN 1980 AND 2000
(in millions of cubic meters)

User Countries	*Industrial Wood* 1980	2000	*Fuel Wood* 1980	2000	*Totals* 1980	2000
Developed[1]	1100	1622	150	<80	1250	1702
Developing[2]	250	463	1000	1200[3] (1900 if available)	1250	1663
Total	1350	2085	1150	1280 (1980)	2500	3365 (4065)

Major categories of industrial wood are:

	1980	*2000*
Sawn wood	455–470	570–652
Woodbased panels	109–125	169–351
Paper (millions of tons)	180–182	357–445

[1] 30% of world population in 1980.
[2] 70% of world population in 1980.
[3] 10–20% for charcoal.
NOTE: Figures include both temperate and tropical products.
SOURCE: FAO, "Agriculture: Towards 2000," Rome, 1980.

FAO concludes that: "Accepting that the figures constitute only a rough conservative estimate of investment needs, their magnitude is striking." To meet the forecast demand, they have calculated that investments of between $1,000 to $1,240 billion will be required to keep the world adequately supplied with forest products (excluding fuelwood) between now and 2000.

Between $340 and $440 billion of this total ($17 to $22 billion per annum) will be needed by the developing countries, mostly tropical. Between $2.3 and $3.8 billion per annum of this will be for expanding capital industrial plant, and $1.7 billion per annum for replacing existing plant, while $0.8 to $0.9 billion will be for logging and primary transport equipment. But by far the greater part of the sum for developing countries, $12 to $16 billion, is needed for plantations to replace wood being cut.

In the short run these would reduce pressure on rain forests, and

[46] John S. Spears, "The World Bank's Forestry Lending Program," Geneva: U.N. Conference on Trade and Development, 1980.

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in the longer term they could take their place as the main source of supply for industrial and fuel wood. In 1980, plantations of tropical hardwoods for use as sawwood totaled 43,490 square kilometers, and there were a further 27,180 square kilometers of softwoods for chipping and veneer, as well as 44,440 square kilometers planted to provide fuel. As a first crop of the fastest-growing species may produce up to ten times the *usable* volume of natural rain forest (20 cubic meters of wood per hectare per annum as against two to six cubic meters), so by 2000 these plantations in theory could produce some 230 million out of the FAO-projected total world demand of 3,365 million cubic meters of tropical timber. To satisfy *all* of this demand we would need to start increasing the area of plantations by 15 times immediately, to some 1,700,000 square kilometers—nearly 11 times the rain forest area currently being cleared annually. The total cost would be between $170 and $272 billion ($10 to $16 billion a year, over 17 years).

As world demand outstrips supply, forest product prices can be expected to rise steeply, until eventually they reach the cost of replacement. By 1990 there should be strong incentives to invest in fast-growing trees; while after about 2010 even plantations of slower-growing hardwoods should be attractive. Already some planting is being done in anticipation of these forthcoming shortages, the largest scale example being Daniel K. Ludwig's billion-dollar Jari scheme near the mouth of the Amazon, where it was hoped to grow *Gmelina arborea* and *Pinus caribaea* trees on very short rotations of 7–15 years.[47] The notion that industrial forest plantation methods like those of the United States or Scandinavia can be transferred to the tropics has been disproved again and again, and very expensively, during the last century, and no more so than in this case. Of 15,000 square kilometers purchased, over 1,000 were planted after felling and burning the rain forest. A 500-tonnes-a-day pulp factory was constructed in Japan, and towed to the site; but the trees failed to grow as expected, and today the scheme is bankrupt, its $180 million of debts assumed by the state-controlled Banco do Brasil.

Plantations require heavy investment and skilled management, and are seldom yet commercially viable when shorn of tax advantages—while natural forests appear to be free. Plantations on the

[47] A. Greaves, "*Gmelina*—Large Scale Planting, Jarilandia, Amazon Basin," *Commonwealth Forestry Review*, Volume 58, No. 4, 1979, pp. 267–69; Antonio Machado, "A Encruzilhada do Jari," *Veja*, December 3, 1980, pp. 68–79; Hamlet Pauletti, "The Forest Closes in on Millionaire Ludwig," *WorldPaper*, January 1981, p. 3; Bernardo Kucinski, "Brazil's Amazonian Dream Ends Up as a Nightmare," *The Guardian*, London, January 13, 1982.

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largest scale are needed, but the danger is that the magnitude of the sums required to create them will accelerate rain forest destruction—in which case the cure will be worse than the disease. If existing wastelands were reclaimed, however, and existing damaged or cleared forest replanted, adequate lands would be immediately available; and if tree planting was combined with agricultural settlement, costs and labor problems could be reduced. Such agroforestry projects are still in their infancy, but have been successful in several countries.[48] At their best they follow closely the models established by tribal peoples, using agriculture and tree plantations as parts of a Building phase that leads on to Mature-phase forest, which occupies at all times a majority of the land used.

VII

One central fact emerges from this survey: that tropical rain forests are considered disposable; that they and their products are cashed in wherever possible, or destroyed and converted for quick profits—whatever the long-term consequences. This situation has arisen historically for a number of reasons:

1. Governments and foresters are largely non-commercial in outlook: they operate their forests as a sort of charity, offering agriculture and ranching with their lands, and providing the multi-billion-dollar high-profit-making timber and forest products industries with their raw materials, all at far below replacement costs. Farmers, on the other hand, operating on short rotations, know their costs and price accordingly.

2. As a result of this, the true cost of producing tropical timbers is unknown, except in a very few cases such as plantation teak. The cost of producing rain forests is even less known—they are "grown by God." The value of their environmental benefits can be gauged only by the cost of replacing them, which is enormous; while that of their contained species and materials is unguessable, because we have hardly begun to exploit them.

3. The existence of huge areas of natural rain forest for the whole of past history has meant that the available supply of tropical timbers and forest produce has always greatly exceeded the demand.

4. Because of this historical oversupply, the price of tropical trees *in the forest* is negligible—heavily forested land can be bought for

[48] J. Dubois, "Aspects of Agroforestry Systems used in Mayombe and Lower Congo (Zaïre)," and other papers in *Workshop Agro-Forestry Systems in Latin America*, Centro Agronomico Tropical de Investigacion y Ensenanza, Costa Rica, 1979; International Labour Office, "Appropriate Technology in Philippine Forestry," Geneva, 1977.

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$25 to $100 per hectare throughout the tropics. Timber prices are based mainly on felling and extraction costs, with a markup dependent on current demand. Wherever supply constraints exist, however, as with certain furniture woods, prices are consistently high.

5. Because they are relatively so cheap—whatever the consumer countries say at the United Nations Conference on Trade and Development (UNCTAD), or timber trade representatives say in the press—world demand for tropical timbers has grown faster than that for any other major raw material.

6. Because of these low prices, waste is on a scale inconceivable in a world whose resources are finite and shrinking—and in some countries it has become advantageous to destroy forest, convert to agriculture or ranching for as little as three to five years, and then abandon the derelict land.

Despite wide awareness of the gravity of this situation, and of the speed and extent of tropical deforestation, no coherent plan for tackling the problem has been adopted. Partly this stems from despair at the seemingly unrealizable sums needed, and partly from the economic weakness and disunity of the rain forest nations. Between 1984 and 2000 some $700 to $2,790 billion for human settlement; another $240 to $320 billion for reforestation and industrial wood plantations; between $96 and $128 billion for industrial plant and equipment, and further unestimated sums for fuelwood plantations, would be needed: sums totaling between $1,200 and $3,500 billion over a 16-year period ($75 to $219 billion per year) *at a conservative estimate*.

Could we contemplate multiplying today's debt burden by anything up to six or seven times, unsecured, and without clear prospects of adequate returns? Yet without such funding, already dangerous conditions for vast landscapes and huge populations will slide further toward catastrophe; irreparable damage will be done, costs will escalate, and eventual costs will be incomparably greater.

Though both FAO and the World Bank, the two largest international organizations currently involved in reforestation and agricultural settlement, have unrivalled expertise, forestry is very much a junior partner within both organizations—undoubtedly because, both globally and hectare for hectare, the financial returns from agriculture are currently so much greater. In their development planning, agricultural uses are almost always given preference over forestry, where there is a choice between them—despite the often greater long-term benefits of forestry.

Between 1968 and 1980 the World Bank financed 32 major

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reforestation projects in 27 countries (not all tropical), for a total of $1,154,900. During the same period it spent very much greater sums on projects destructive of forests—roads, hydroelectric schemes, pulp mills, and much else. Since 1980 its lending for forestry has increased from 0.5 percent to six percent of its total agricultural [sic] spending, and it has proposed yet further increases, to be jointly funded by the countries receiving the loans. The bank lends at commercial rates of interest, and the economic rate of return on these 32 projects was 11–22 percent, while the cost per hectare varied from $280 in the Philippines to $3,500 in Liberia.[49]

Each World Bank project is a model of careful planning and implementation. Yet increasingly there are fears that the availability of its loans (and those from other sources) may actually encourage deforestation in poor countries: that they can gain in the short term twice over, first by selling their forests, and then by getting loans to reforest and repair the environmental damage—to pay for which they cut more forest; while the banks and lending countries acquire interest payments, export orders, and political and economic power. Indeed, everyone gains except the environment, which is ruined at an accelerating pace.

Clearly the sums available to FAO and the World Bank do not total more than a minuscule proportion of what is needed. And it is hard to imagine the immense funding required being made available to either organization by member governments, who are already critical of the size of their budgets and the way they are spent.

Nor do the efforts of the various conservation bodies offer much hope. Despite the financial stringencies that these organizations habitually suffer, they do outstanding work by fielding research groups to list endangered species and study their habitat requirements, and in securing the creation of national parks and forest reserves, and perhaps above all by arousing public awareness—though not much where this is most needed, in the developing countries themselves.

In 1980 the largest of these, the International Union for the Conservation of Nature and Natural Resources and its sister fund-raising organization, the World Wildlife Fund, together with the United Nations Environment Program, launched the "World Conservation Strategy" in an ambitious attempt to provide guidelines

[49] John S. Spears, "Overcoming Constraints to Increased Investment in Forestry," paper presented at Eleventh Commonwealth Forestry Conference, Trinidad, 1980; John S. Spears, "The World Bank's Forestry Lending Program," *loc. cit.*

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for governments.[50] This proposed three principal objectives: "Maintenance of essential ecological processes; preservation of genetic diversity; ensuring that the use of species and of ecosystems is sustainable" (an important goal being the preservation inviolate of ten percent of tropical rain forests). Unfortunately they spoiled the clarity of this message by an additional aim—"to deliver conservation-based development where it is most needed, notably the rural areas of developing countries." This has proved to be a piece of "double-think" in the context of actual development practices in the Third World, where, because of the competitive factor and the absence usually of a powerful local conservation lobby, good intentions are frequently overlooked where there is a profit to be made. As a result, even governments who have adopted the Strategy have in practice allowed logging within reserves, and have proved unable to protect reserves when all around is poverty, hunger, overcrowding—or greed.

If this is so today, how much more so will it be in 30 years' time, when around the parks the trees have all gone and the lands are waste? The approach of conservation therefore is but a comforting delusion, which at best buys time, and at worst distracts attention from the real issues by asserting that something is going to be saved. For parks and reserves will *not* be saved unless the lands around them are saved also; and this will only happen when the economic, social, educational and political circumstances causing environmental destruction are changed.

In 1983 UNCTAD concluded an ICA (International Commodity Agreement) on tropical timbers, to last for five years; though it has yet to be ratified by member governments, who include both producer and consumer countries.[51] Work toward it, under the chairmanship of Japan (for which tropical timber imports rank second only after petroleum), has been proceeding since 1976.[52] During this period, important work has been done in clarifying detailed aspects of the international timber trade—in categorizing the diversity of tropical trees and other forest products, and in devising information, bargaining, and enforcement procedures.

Eventually it is hoped that funds will be available to members out of a proposed Common Fund, designed to cover *all* commodities for which there are ICAs (cocoa, coffee, sugar, tin, rubber, wheat,

[50] IUCN, "World Conservation Strategy," Gland, 1980.

[51] UNCTAD, "International Tropical Timber Agreement, 1983," TD/Timber/11, Geneva: United Nations, 1983.

[52] UNCTAD, "Preparatory Meetings on Tropical Timber," TD/Timber Series, Geneva: United Nations, 1976–1983.

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olive oil, and jute). The proposed aggregate capital of this Fund is three billion dollars—one third as paid-up risk capital subscribed by members, two thirds as loans carrying interest charges; and with a further three billion dollars on call from participating governments in the same proportions, backed by the collateral of the relevant commodities. The First Account of this Common Fund is intended to provide buffering finance for members undergoing difficulties (chiefly stock spoilage); while the Second Account is intended to finance tropical timber projects, including reforestation, as well as jute, olive oil, wheat, and natural rubber producers, whose commodity is less subject to spoiling if unsold. So far the United States has withheld support; the direct capital sought has been reduced to $450 million, and $325 million has been pledged.[53] In any case, the idea of this Common Fund has now been under discussion for nearly ten years. It is hardly an early possibility; and even if it existed, tropical timber interests could claim but a fraction of its available assets because of the number of competing commodities.

Although the International Tropical Timber Organization established by the 1983 UNCTAD agreement might conceivably develop one day into a "world forum" on forestry, for the present the agreement is severely limited—to cooperation in research and development in three fields: on improving management and reforestation techniques; on a monitoring system "to make the market more responsive to the needs of users"; and on increasing domestic processing by producers. The main purpose of these many years of meetings was to secure an agreement on regulating trade; that so little has been achieved is a mark of the extreme disparity of position of the producers and consumers, as is especially shown in the uncertainty of the tropical timber market, which has been cleverly manipulated by the main buyers (especially Japan) to keep prices low.

VIII

If the prospects for effective international action through existing agencies are thus extremely limited, and those for fruitful cooperation between producers and consumers virtually nil, is there some other way to meet the problems of protecting and replenishing the tropical forest environment in general, and of its gene stocks and special habitats in particular, while at the same time permitting the

[53] Personal communications with UNCTAD and UN staff.

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forest countries to earn an adequate and proper return for their products?

In my view the most constructive and workable possibility would be through the formation of an Organization of Timber-Exporting Countries. At the XI Commonwealth Forestry Conference in Trinidad in 1980, and subsequently, I have put forward the idea of such an OTEC. Since then I have received many comments, ranging from strong advocacy to hostile criticism, but all helpful in clarifying the idea.[54] The name OTEC has aroused some distaste, especially in the United States and Great Britain, where it stirs negative feelings engendered by OPEC. However, OPEC did succeed in focusing world attention on the problem of renewable and non-renewable resources, and it remains the outstanding example of successful Third World cooperation. A neutral name (such as UTFN—Union of Tropical Forest Nations; or WFO—World Forest Organization) could be given to an actual organization; meanwhile "OTEC" is already widely used for discussion, so I shall continue with it now.

At an early stage UNCTAD considered cartelizing tropical timbers, and rejected the idea by consensus. Members feared that if prices were raised artificially there would be widespread development of substitute materials, and that the whole market would collapse; they assumed that a true live market relationship operates between demand and supply for tropical timbers, and that a cartel would jeopardize this; and they doubted whether cohesion of purpose could be achieved. It is worth considering these fears in detail.

Substitution. All the substitutes for tropical timbers are either other species from other countries (the various "mahoganies," etc.), or highly energy-intensive in production. For construction, steel and concrete are the main substitutes; for furniture, aluminum and plastics—and plastics are largely derived from petroleum, coal or wood, or use wood particles as a filler (as first petroleum and then coal supplies diminish, wood must become their main raw material source, and silvichemistry will replace petrochemistry). Demand for hardwoods is predicted to expand greatly, and supplies are diminishing. Therefore a large enough group of tropical forest nations should be able to exert considerable leverage on the prices and supplies of substitutes as well as on the hardwoods themselves.

Concerning tropical softwoods the position is less certain, for

[54] Nicholas Guppy, "How Forest Conservation Could become a Profitable Operation," (1980) and "Why OTEC?" (1981), reports distributed by the Threshold Foundation, London; Nicholas Guppy, "Proposals for an Organisation of Timber Exporting Countries (OTEC)," *The Malaysian Forester*, Vol. 46, No. 2, 1983, pp. 1–19; Nicholas Guppy, "The Case for an Organisation of Timber Exporting Countries (OTEC)," in S.L. Sutton, T.C. Whitmore and A.C. Chadwick, Eds., *Tropical Rain Forest: Ecology and Management*, Oxford: Blackwell Scientific Publications, 1983.

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atmospheric pollution is reportedly killing large tracts of temperate softwood forests in the Soviet Union, Canada, Germany and Scandinavia.[55] How long such dead or dying trees would remain usable if unharvested is uncertain, and during this period prices for tropical softwoods would have to remain low of necessity. But in the longer term all temperate-zone softwood producing nations would surely wish to take advantage of higher prices created by a primarily hardwood cartel, and might wish to join.

Market Forces. Mature-phase rain forest trees take 80–200 years to develop fully, and rain forests themselves 400 years or more. There can thus be no true live market relationship between the demand and supply for either; and there is a strong legitimate case for removing both of them from the unrestrained action of market forces.[56] Some sort of "handicap" system is needed to place natural forests, for which no growing costs have been incurred, economically on a par with alternative uses for their land, especially when these can be shown to be of only short-term advantage—as has been abundantly demonstrated with rain forest. Such a handicap would need to be imposed artificially, through international action by means of a cartel or other structure.

It has been suggested that such action should first develop on a regional cooperative basis, through ASEAN (Association of Southeast Asian Nations), OAU (Organization of African Unity), or the Amazon Treaty countries. Yet already cooperation within ASEAN has included timber marketing and pricing: nonetheless the forests of Thailand have virtually disappeared, while those of the Philippines, Malaysia (which is deforesting even more drastically than Indonesia, though with less publicity) and Indonesia are following fast. This situation will not change until the major rain forest countries *of all three regions* simultaneously unite in a single organization.

Lack of Cohesion. Perhaps even more significant than the sums required to solve the world's rain forest problems has been the lack of success of existing forums (such as UNCTAD, ASEAN, OAU) in getting conflicting factions to agree. A body representing both consumers and producers might concur in an ideal world, but is hard to make work in this one, where each country must be expected to pursue the course most to its advantage. But would

[55] Boris Komarov, *The Destruction of Nature in the Soviet Union*, London: Pluto Press, 1978; Brian Jackman, "Ten Billion Dying Trees," *The Sunday Times*, London, April 4, 1983.

[56] Fast-growing Building phase trees are irrelevant in this discussion, as growing them is a form of agriculture; so are FAO or other official figures of "production" from tropical forests—for they actually refer to *harvesting*, and from a shrinking supply base (which, against an ascending demand curve, is a classic formula for disaster).

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such conflicts prevail in a purely producers' organization with a single purpose?

It has been said that because of their weak economies and lack of political will, tropical forest countries would be unable to maintain cartel prices in the face of trade retaliation, or sustain agreements on sharing costs and benefits; and that the larger forest countries within the cartel would object to cutting less than their annual hardwood increment. Much the same sort of things were said about OPEC originally. But OPEC survived because the level of benefits it produced were so enormous as to ensure adequate cohesion even in troubled times.

It would be unrealistic to suppose that governments, corporations and individuals would readily give up the "license to print money" that rain forest destruction has become, unless they could obtain greater immediate short-term financial benefits from preserving than from destroying it. A timber cartel would have to achieve these by raising timber prices substantially—at least into line with currently cheaper alternatives, viewed globally. The experience of OPEC suggests that, once prices were raised, though countries outside a timber cartel might accelerate cutting and sell at lower prices, non-cartel prices would lag only slightly behind those of the cartel.

The Reforestation Fund proposed by UNCTAD, and the reforestation projects funded by the World Bank and other agencies, small though they are compared with what is needed, all represent hidden extra payments, above market prices (and mainly out of consumer nations' taxes), for rain forests and their products. But they do not strike at the heart of the problem, which is the low *market* value of these forests and products compared with other land uses and substitutes (many of whose low prices depend on the cheapness of their forest-derived ingredients). The object of an OTEC would be to redress this imbalance openly by increasing massively the asset worth of tropical forests and of the countries in which they occur, and to realize this enhanced value commercially.

This could be achieved by various forms of taxation, such as a Reforestation Tax,[57] or an Export Tax coupled with an Environmental Degradation Tax,[58] depending upon each country's internal circumstances and trade agreements. A scheme which preserves the operation of market forces more flexibly than taxation is that of Herman E. Daly.[59] With this, "Depletion Quotas" of a resource (in this case giving the right to fell a particular volume or area of

[57] Spears, paper cited in footnote 49.
[58] Guppy, final article cited in footnote 54.
[59] Herman E. Daly, *Steady-State Economics*, San Francisco: W.H. Freeman & Co., 1977, pp. 61–68.

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timber, whether publicly or privately owned or under concession) are auctioned by governments. Reserve prices can be calculated and set which leave an incentive to buy, and can be raised progressively as the market adjusts upwards. So long as the reserve is not set too close to the market equilibrium point (at which there is no incentive to buy), the government thus captures what economists call the "Price Scarcity Rent" of the resource. Psychologically also, the purchaser of a quota knows what he is buying, whereas the payer of a tax does not.

Requirements of an OTEC would include commitments:

1. To reduce the exploitation of forest lands (especially natural forest) by means of legislation.
2. To increase the price of forest products by means of taxes, or by setting a reserve price on each harvesting quota auctioned.
3. To use the extra revenues thus created in agreed ways, and to pay a portion of these revenues into a common fund, whose main function would be to provide buffering or other finance when needed by members, and which could be used also to exert leverage on members not meeting their obligations.
4. To coordinate these actions in harmony with other members.
5. To agree on a timetable for the above.

Ten countries (Table I) contain 75 percent of all tropical forests; and a somewhat different ten countries export 92 percent by value of all tropical forest produce. Combining these two lists, we find that 17 countries represent over 92 percent of the world export trade in tropical timbers by value, over 92 percent by volume, and over 90 percent of the remaining tropical forests by area. If the decision-makers of these 17 countries could be persuaded to cooperate, an effective OTEC could certainly be created. These countries are (in alphabetical order): Bolivia, Brazil, Burma, Cameroon, Colombia, Gabon, India, Indonesia, Ivory Coast, Liberia, Malaysia, Papua New Guinea, Peru, Philippines, Venezuela, and Zaïre. (For comparison, OPEC consists of 13 nations, of which Gabon, Indonesia and Venezuela are in this list.)

Just what export (and local) price increases should be sought would of course depend on the market situation and the current comparative prices of substitutes for tropical woods. The object should be to generate increased income for the producing countries, to reduce waste and regulate production levels, and at the same time to avoid price levels that would upset the world economy or lead to massive and uneconomic efforts to develop substitutes. And the surplus over present income should be used by the producing

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countries, at least in part, for systematic reforestation and conservation measures.

For illustrative purposes, as OTEC got under way, export price increases achieved by it could generate revenue surpluses as follows: for member countries a 50-percent increase would generate a surplus of approximately $2.7 billion per annum, with an inflationary push of 0.13 percent on world export prices, and a push of 0.03 percent on world GNP; a 300-percent increase would generate a revenue increase of some $16.3 billion per annum, with an inflationary push to world export prices of 0.8 percent, and a push to world GNP of 0.16 percent (excluding possible multiplier effects in both cases). If a 300-percent increase was accompanied by a 25-percent reduction in harvesting *by volume*, the surplus export revenue derived would drop to $12.2 billion per annum for member countries; while if the reduction was by *area*, and waste was diminished substantially, there need be no loss of revenue.

But could the market support such price increases? And would the public tolerate them? Outside the tropical forest countries there would be many beneficiaries from an increased asset value of forests and timber stocks, including non-tropical countries like the United States, which produces both hardwoods and softwoods in great quantity. Timber companies would benefit, so long as the price increases were firmly maintained; because of the multitude of ways in which timber is used, the added costs would be spread more widely and thinly than were oil price rises, and might in part be absorbed. Based upon forecasts of timber consumption (Table III), initially Japan would bear 38 percent of such price rises; Europe, 27 percent; the United States, 16 percent; and all other importers combined, 19 percent—*considering export price rises alone*. Japan might therefore be expected to oppose an OTEC most strongly, and as it is the main importer of Indonesian oil and of Indonesian timber (90 percent of plywoods used in the United States come from Japan and are made from mainly Indonesian and Malaysian Dipterocarp woods), Japan, if it so wished, would be in a position to exert pressure upon Indonesia not to join. Yet there is no doubt about Japan's genuine concern at the depletion of tropical forests, as is shown by its offer of $100 million through ASEAN for the setting up of a regional forest research center.

Bearing all considerations in mind, the price rises mentioned are small compared with those achieved by OPEC (some 900 percent over nine years)—in the case of OPEC it was the very magnitude of its increases that ensured cohesion and success. OPEC's huge cash surpluses accrued to relatively few nations, mostly with low popu-

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lations. The tropical forest countries are more numerous, with far greater populations in aggregate, and the resulting benefits would be widespread. As their economies expanded, the percentage of the price rises borne by the developed nations would fall dramatically, as can be seen from Table III, until eventually 60 percent of these revenues would derive from the producer nations themselves. Surely the extra initial costs would be a small price to pay if the surpluses generated were used to solve the current human and economic troubles of these nations, and avert the yet greater and more costly environmental and human problems that today seem inexorably approaching.

Even though the figures mentioned refer only to export prices, and to the first steps in getting tropical forest destruction under control, they greatly exceed all sums at present available through existing organizations. And they would increase as local price rises joined those of exports. As prices rise, we can anticipate that fuller utilization of tropical trees will be made—indeed, theoretically, if waste is eliminated, the area logged can be reduced by 50–90 percent with no loss in volume output. And other similar contractions of scale throughout this toppling edifice of causes and effects can be anticipated, which will rapidly reduce the magnitude, complexity and costliness of rain forest problems to manageable proportions—once revaluation is applied. For while money appears the immediate issue, lack of it has not produced these problems. The deepest layer of the cake is what Oscar Wilde would have called Cynicism—knowing the price of everything and the value of nothing. When price and value are not identical, the world loses shape.

The responsibilities of an OTEC would be far greater than those of a conventional cartel. Besides obligations to maintain and enhance the financial value of a major national asset of each member state, and to secure adequate returns from it, it should concern itself with ensuring that member states protect the forest environment in general and gene stocks and special habitats in particular, create plantations to supply industrial and fuel wood, benefit indigenous tribal forest peoples, settle encroachers, and much else. Such tasks are those of governments—indeed of government at its best. But each nation has its own customs and problems, each government its own laws and procedures. A cartel structure, cartel goals, and cartel methods are too simple to take all these into account. What is needed is a Treaty Organization, and initially there would have to be a secretariat to establish a series of agreements (decla-

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rations of intent) with individual governments, and coordinate their efforts until the actual OTEC Treaty was signed.

Although OTEC would be self-financing through membership dues, its start would have to be funded, and the availability of outside buffering finance for member countries during its early years might make the difference between its success and failure. And here a crucial point should be noted. There is not much public sympathy for artificially raising prices in the case of a commodity such as tin, silver, or cocoa; but there *is* grave public concern at the plight of tropical forests, and an organization designed to conserve them through a justifiable revaluation might therefore be supported without criticism by the World Bank, UNCTAD (a more effective use of their reforestation funds?) or other agencies.

IX

The details of such an organization are of course subject to substantial adjustment in the light of national circumstances and many other factors. My point is that, unless coordinated action of this sort is undertaken, the tropical rain forests of the world are doomed, through the uncontrolled operation of the forces described in this article. Their loss will be a calamity for the world as a whole—and of a magnitude and diversity that we are only now beginning to gauge.

To many, the solution I propose will not seem ideal. But clearly it would be in the national interests of the rain forest countries themselves, and in the medium and longer terms equally clearly it will be in the interest of the consuming countries and of the world as a whole. We have only a few years in which to set in motion such an organization. It should be urgently considered by all the countries concerned.

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Lewis Thomas

SCIENTIFIC FRONTIERS AND NATIONAL FRONTIERS: A LOOK AHEAD

Global Interdependence in Science

Science is the most communal of human endeavors. The vast structures of physics and biology assembled in this century were put together piece by piece by countless people whose identity has by this time been forgotten. The major figures, whose names are stamped there perhaps forever, were gifted in being able to figure out where the key pieces would fit, but the pieces themselves came from other minds and hands. Albert Szent-Georgi once remarked: "Discovery consists of seeing what everybody has seen and thinking what nobody has thought."

It is easier to recall the names of the participants years ago, because there were so few to remember. Science began as a very small enterprise, involving a few amateurs, but even then they were in touch with each other, communicating their findings. Communicating has long been a familiar word in scientific jargon. Papers submitted to the Proceedings of the Royal Society and the National Academy of Sciences are *communicated*; the word is printed there on the front page under the authors' names. In the case of the Proceedings of the National Academy of Sciences there must also be printed, by federal law, a note at the bottom of that first page stating that the costs of publication of the article have been paid by the author or authors, or by their parent institutions, and that because of this the article must officially be designated as an "advertisement." It is a very small sign of the increasing involvement of government in the style and manners of science, a minor but disturbing signal, to which I shall return.

Today's science has expanded, within just the years of this century, from a small enterprise to an immense industry, from the commitment of a few hundred workers to one involving hundreds of thousands, maybe millions, here and abroad.

And so it is, in the face of the legislated mandates of the various governmental agencies reponsible for the sponsorship of their own national science, and despite their zeal to enhance the research and development capacities within their various nations, that there is in being a worldwide community (or *nearly* worldwide, considering the sidelines position still held in some fields by the Soviet Union) of

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working scientists who do their work together, across oceans and national borders, without any awareness of national or ethnic or social identities. They make up, in the aggregate, the largest and most cohesive of underground movements to be found anywhere on the globe; subversive in the literal meaning of that word, which is to turn things upside down.

I am not surprised that governments are edgy about the scientific communities under their governance; I am surprised that they are not more worried. Statesmen like to arrange the affairs of state in whatever orderly fashion they find most equable and stable; they do not like the prospect of having the ideas of people under their rule upheaved any day, revolutionized, changed beyond their comprehension. Or, if things like this are to take place, the statesmen would prefer to arrange them in advance, calling the shots for science before science gets round to publishing.

Political doctrines can sometimes be made to conform to scientific truths, I suppose, but only after all the facts are in. It was feasible for a while, in the years after *The Origin of Species*, to cook up crazy notions about Social Darwinism and to base social policy on those headlong extrapolations, but later on, given more scrutiny of the real facts, the sociological theories lost their underpinnings. Lysenko's pre-cooked ideas about state-controlled plant genetics were attractive to Stalin, but the research had been fabricated meticulously beforehand and then tucked in place to fit with orthodox doctrine and failed, predictably and miserably. It is easier, I think, to fudge in politics than in science. I would be glad to take it farther: it is possible to fudge in politics forever, but only for a limited time in science.

This is not to assert that the facts about nature obtained by working scientists and passed along to the world are always and necessarily true, in the sense that they can then stand forever as immutable, enduring pieces of information to be added to the world's knowledge. To the contrary, great masses of the data that keep coming in are accepted for a period of months or years and then seem to drop away from notice, lose their relevance, and are replaced by new sets of information and new theories to explain them. A surprising number of scientific facts turn out to be biodegradable.

This generalization hangs on what is meant by a scientific fact. I tend to call something a fact when the data, taken together, *mean* something. It was a simple declarative statement, accepted nearly all round in the mid-nineteenth century, that our sun and solar system were several hundred million years old, but no older than that. Lord Kelvin, already a tremendous figure in classical physics, arrived at the fact by calculations based on the known sources of energy and the known rates of energy loss. The numbers were stressful for Charles Darwin, posing what he termed one of his "sorest troubles" in formulating the theory of evolution. A few hundred million years was simply not a long enough stretch of time into which the process of evolution could be compressed. T.H. Huxley pointed out then that the facts of the matter, based on perfectly straightforward mathematics, were perhaps not as solid as they seemed. But it was not until much later, after atomic physics had emerged and it became possible to calculate the earth's age on the basis of a new level of science, that the real facts were found to fit with Darwin's theory.

Kelvin had still another opportunity to get the facts, the meaning of the data, wrong, and he was not alone in this. In a famous address before the Royal Society around the turn of the century, he celebrated the full maturity of his science.

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Physics, he stated, had now come almost its full distance as a completed intellectual endeavor. All that remained to be done was to tidy up a few loose ends and straighten out some small, bothersome anomalies, and physics would be home and dry. He would not have advised a young ambitious scientist to come into such an almost-finished discipline. Then came radiation, the quantum, relativity, the atomic nucleus, indeterminacy and all the rest of twentieth-century physics, and a new world of facts and theories displaced the old one.

Recently, the eminent British cosmophysicist Stephen Hawking stated publicly that the fundamental laws of physics are nearing full comprehension, and that the deepest problems in modern physics will all be solved before the end of this century. Others have begun nodding their heads in agreement, and when we reach something like a consensus on this important matter, sometime within the next ten or 15 years, it will again be time for us to be upheaved, all over again, perhaps into another new kind of universe, with another sort of huge puzzle to solve. For the time being, physics seems to have run out of paradoxes, but this does not mean that there are no paradoxes out there, waiting to be found.

II

One conventional, nice thing for a scientist to say when being praised for a major discovery is, "I stood on the shoulders of giants." This sounds like the most modest of boasts, although admitting to a measure of agility in getting up there to stand. In real life, though, the shoulders are those of other ordinary-sized scientists, some long dead, others just down the corridor. Once in a while, the shoulders are in fact not stood on, merely glanced over.

Most of the time, however, the information is passed around like free gifts, almost as though science were an enormous, perpetual party. A sizable amount of the pleasure in doing research comes at the moment when it is possible to tell someone about it. It is not true that scientists live in the tense fear that someone else will get to the final answer first, nor that they will kill or die when priority is at stake. A good working scientist, exploring his particular puzzle, will rush out into the corridor, even into the street, if he thinks another scientist will be there to listen to his latest piece of news. Most research is exploring in the first sense of that word: "to cry out on finding."

This is true, at any rate, in the general field of basic biomedical research. It is not so true, for obvious reasons, in applied science, where the commercial stakes usually impose a period of silence.

At this point, it may be appropriate to define the terms. The taxonomy of scientific endeavor has become more complicated in recent years, with much blurring of the formerly sharp line dividing basic from applied science, but the difference is still there. If the research is intended to explore a mechanism in nature for its own interest, in order to find out how it works and what the component parts may be, and if the questions on which the experiments are based are tentative questions, raised as guesses in an atmosphere of uncertainty, and if when a guess turns out to be correct the result comes as an overwhelming surprise, you are doing basic science by my definition.

Changing one's mind about the next experiment, even about the original hypothesis, is typical behavior. It makes no difference if something useful and usable emerges at the end as a product; it is the uncertainty at the beginning and throughout, about how the work will turn out, that makes it basic research. The surprise is not essential for my classification, althought it is true that successful

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basic research is often associated with one exhilarating surprise after another, and that is one of the reasons for liking this occupation.

Applied research is a radically different kind of endeavor. Here, you need at the outset an array of solid scientific facts, most of them uncovered previously by people engaged in basic research. The array must suggest that something useful and usable, a product or a new technology, can be assembled by pursuing a line of inquiry indicated by the data at hand. There needs to be a high degree of certainty about the desired outcome before the work begins. Typically, the process involves teams of investigators and a detailed protocol of the steps to be followed by each participant. There must be a general agreement by all parties that they will do exactly what the protocol says, from start to finish, without changing their minds. If the work turns out to be successful at the end, with the desired product in hand, there is quiet satisfaction all round.

In applied research, the surprise comes if the thing does *not* work. An elegant example of applied science in medicine was the creation, by Jonas Salk and his collaborators, of the first vaccine against poliomyelitis. Once it was known, from basic research done by others, that there were three distinct antigenic types of polio virus, and only three, and that they could be produced in tissue cultures by the methods devised by John Enders, the vaccine became a certainty, and so it was.

In between these two there has emerged a sort of hybrid science. It might be called basic applied science, or purposive basic research, or targetted guesswork. It has become a dominant style in biomedical science in the past decade, and is best illustrated by what is happening today in research on the phenomenon of cancer.

Two methods, each derived from separate lines of basic biological research, are involved. The first comes from the high technology of recombinant DNA, which has made it possible to identify naturally existing cancer genes in many different varieties of normal cells. When these genes are switched on, or moved about from one part of the genome to another, the normal cells are transformed to cancer cells. The mechanisms responsible for switching them on, and the nature of the gene products that then do the transforming, are entirely unknown, anyone's guess, nor is it at all clear what mechanisms come into play to change the physical and chemical operations of the cell. This can be regarded as basic research at its most profound level of uncertainty, in need of any number of testable hypotheses and, very likely, innumerable experiments bound to end in failure and frustration. But it is also applied science, in the sense that it is targetted toward a product even though the product is still invisible.

The second technique is derived from a piece of basic research begun two decades ago, when it was observed that any two unrelated cells, from the same or different species, can be induced to fuse together forming a single cell with a single nucleus. The phenomenon was turned to use by cell biologists, who created lines of mouse-human hybrid cells for learning which enzymes in the cell were coded for by the genes on one or another chromosome. Then, some years later, Milstein and his colleagues in England had the brilliant idea of fusing an antibody-forming lymphocyte with a mouse cancer cell, for the purpose of creating live and immortal factories producing absolutely pure antibodies, known as monoclonal antibodies.

This technology is now being applied to the study of oncogenes, in hopes of identifying the specific proteins and other gene products that are produced by

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cancer genes. It is pure guesswork that the method will accomplish what is intended, and something like total uncertainty as to what kinds of substances are to be looked for by this immunological approach. Meanwhile, the same sorts of pure anti-cancer antibodies are being explored for their potential as therapeutic agents, in hopes that they will seek out all cancer cells in the body and destroy them one by one.

This is basic science at its best, pure research for the purpose of finding out how things work in cancer cells. But it is at the same time a venture in applied science, for no one doubts that as the news comes in we will not only be provided with a genuine comprehension of how cancer cells work, but will very likely know some useful and usable things to do for the reversal and control of the disease.

This line of work provides, as well, an excellent example of the ways in which biomedical science has been carried out as an international venture, moving back and forth across national boundaries. If the problem of human cancer is solved by one or both of these approaches, the ultimate solution cannot be fairly claimed by any nation, nor by any particular laboratory or group of laboratories within a nation. The work has reached its present stage of high promise as the result of the most intricate network of international collaborators, and it will have to progress in the same way if it is to be successful.

To be sure, there will be the usual strident claims on priority by whatever laboratory is successful in putting the final piece of the puzzle in place, but everyone will know (and, I hope, remember) that the puzzle itself could not have been shaped into being without the most intense cooperation within that international network, over a period of at least 30 years. Crucial bits of information, indispensable for today's level of incomplete comprehension, and even more indispensable for framing the questions that still lie ahead, have come from laboratories in Great Britain, France, West Germany, Switzerland, Belgium, Denmark, Norway, Sweden, Japan, Australia, Canada, Israel, Italy and the United States.

The workers in the field have been keeping in such close touch with each other that all of them know the contents of the latest paper months before its publication in a scientific journal. The word gets around these days at almost the speed of light: the results of the latest experiment in Edinburgh or Boston are known to colleagues in Melbourne or Tokyo almost as soon as completed. The mechanism for the international exchange of scientific information is informal and seemingly casual, resembling gossip more closely than any other sort of information system, except that gossip has the reputation of unreliability and this exchange is generally solid and undistorted. It arrives by telephone, or out in the lobbies and bars of the hotels and institutes where international symposia or congresses are being held, or in quick conversations between people of different nationalities crossing a campus lawn in one country or another. For the moment, the international language of science is broken English, but a surprising number of young English and American investigators are coming along partly equipped with at least French and German.

The information is not just passed around automatically, it is literally given away. This is a curious phenomenon in itself, looking something like altruism in the biological sense of that term. It is intuitively recognized by all the participants that this is the only way to keep the game going. If a piece of one's own brand-new information, just fished up in one's own laboratory, is withheld from another

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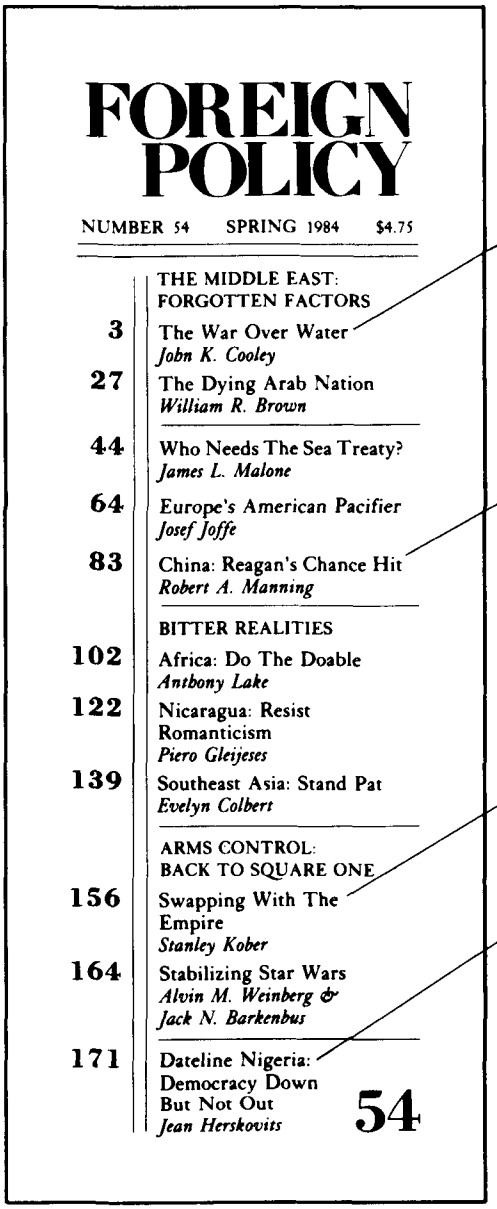

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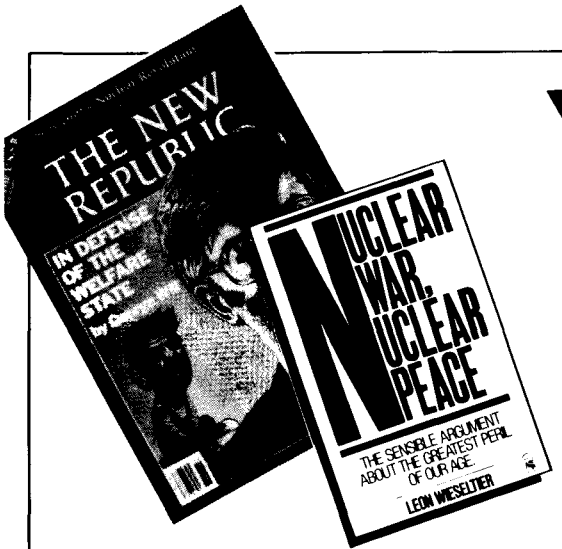
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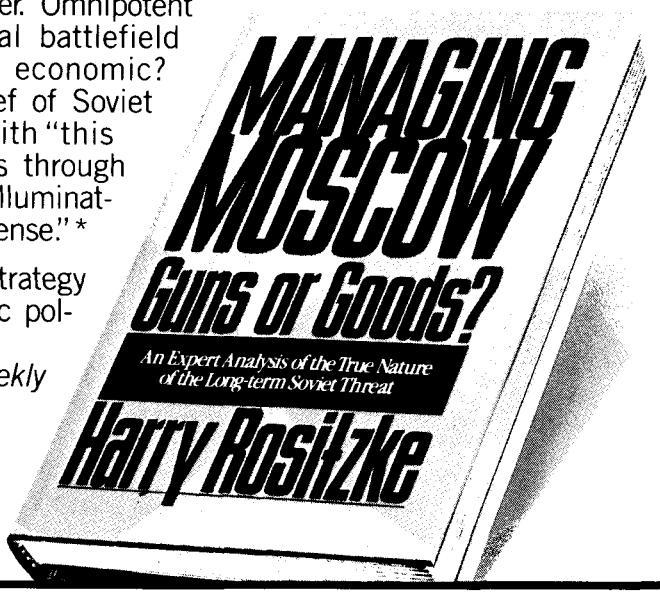

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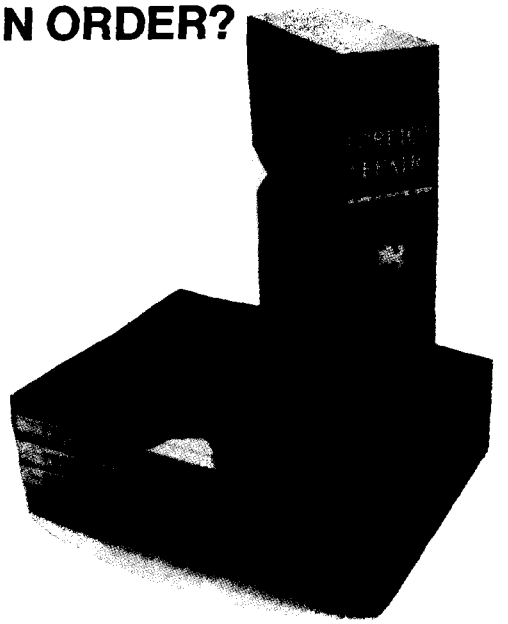

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laboratory in another place in the interests of secrecy, the flow of essential information from that laboratory's work may also be stalled, and the whole game will slow down, maybe stop altogether.

Altruism may be too strong a term for the exchange, implying the sacrifice of something personally treasured and important. A better word might be symbiosis, for there can be no losers in the long run if the game is played in this way.

III

Simultaneously with the international exchange of basic scientific information, there has been an even more active transport of young scientists across borders. Up to now, most of this traffic has involved great numbers of Japanese, Indian, Korean, Taiwanese and Iranian scholars at the postdoctoral level, joining laboratories in this country and in the United Kingdom, in Europe and in Canada and Australia. Some of these young scientists plan to go home again after a period of several years' training, but many of them have changed their minds and hope to stay on as semipermanent visitors. In recent years, postdoctoral students from mainland China have also been coming abroad, all of them with the declared intention of returning to the People's Republic.

This kind of exchange, by the way, has nothing at all to do with altruism, and any resemblance to symbiosis is quite unintentional. Two forces are at work. First of all, the young people crossing our borders to work as postdoctoral fellows are coming here to learn science because there are too few opportunities for them in India, Japan, China, Korea or wherever. And second, we are delighted to have them because they are highly motivated, bright and quick to learn, and willing to work extremely hard for relatively low stipends. Also, sad to say, the numbers of equally qualified young Western nationals who want to come into science in their own countries have gradually diminished in recent years, while the demand for more researchers at this level has steadily increased.

I am not sure what the implications of this phenomenon are for the future. Perhaps it will turn out, as it should, all to the good. The young alien scientists, many of them anyway, will go home highly trained for research and potentially very productive and profitable for their home countries, and in the meantime those countries should have strengthened their own universities and scientific institutions to receive them and put them to work.

On the other hand, it may not go this way. The foreign nationals may feel compelled to stay on in the West because of no openings at home, and we will at the end have effectively drained away precisely the talent needed by the home country for its future. It is a problem that we have not been inclined to worry much about at policy levels, not in the American universities and research institutes anyway. We have been glad to have the needed hands and brains, and expect someone else, presumably in Washington, to think about the long-term future. Or if pressed, we can think up ready solutions for someone else to implement, like directing more foreign aid to be targetted to strengthen Indian or Chinese universities, without stopping to think how hard and complicated a task that might turn out to be.

I do not worry in this way about Japan. Indeed, I hope the young Japanese postdoctoral students keep on coming, for they have added greatly to the quality and volume of American biomedical research. Furthermore, basic science is building nicely in Japan, and before long I expect there to be ample opportunities for the returning research fellows to find good jobs there. If their scientific

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affairs go as well as they should, I look for a time ahead when some of our best American students will hanker to spend a couple of years learning something new in Tokyo or Osaka. But I do not have this optimistic feeling about India, or Pakistan, or Korea, or mainland China or, heaven knows, Iran.

The migrations of talented young investigators within and among the Western countries themselves have been fairly steady and active, with cyclical ups and downs depending on the nature and progress of research in the numerous institutions involved. I do not know the current numbers, but I see no signs of any draining of brains from one country into another, certainly no massive emigration from Europe and Britain into the United States such as occurred in the decade after World War II. I do see a much more encouraging international phenomenon: there are many more travelling scientists of all ages, ranks and nationalities, ambling into laboratories here and abroad for short stays—a few weeks or months—in order to learn a new technique or to bring in a new technique for quick application to an engrossing problem not available in the home laboratory. This is a wonderful thing for the progress of science in general, and the best of ways for scientists to make friends with their counterparts abroad. I commend it to the attention of foundations interested in international amity as well as science, and I commend it especially to those agencies of government with similar concerns.

I wish that something like this could begin to take place with the countries of Eastern Europe. Even more I wish, but with a lot less hope, that we could begin exchanging biomedical information and young (especially young!) biomedical scientists with the Soviet Union. The basic biological and behaviorial sciences seem to have slowed down to a near halt in Russia in recent years, or if this is not so there has surely been something appallingly wrong with the existing systems for information transfer. On the available record, there is little evidence that Soviet biology has been caught up in the contemporary biological revolution.

As for the exchange of working scientists, it has never really been tried, for various obvious reasons, and I suppose these are the worst of times to try again. Nevertheless, I wish it would happen. It would not necessarily be the entirely one-way street it is so often said to be. There are some extremely interesting studies in ecology, both theoretical and in the field, now going on in the U.S.S.R., and I keep hearing—and occasionally reading—of interesting Russian research on the relationship of neurologic and immunologic mechanisms. In any case, there is no doubt that young Soviet researchers now at the postdoctoral level would find enormous interest in the kinds of biology now being done in Western laboratories. But there it is, and, I suppose, there it lies for as far ahead as one can see. I just wish it were different, and incidentally I cannot think of a better audience than this to say this to.

I remember a time, in a stretch of almost 20 years before the close-down in Czechoslovakia, when a small cluster of Czech biomedical researchers in Prague had achieved a position of such eminence in my own field, immunology, that we used to hold regular conferences in that lovely city. The liveliest problem for immunology in those years was transplantation biology, and the laboratories at the Czech Academy of Science and Charles University were among the most interesting in the world. During that time the restrictions on travel were easier, and one or another young Czech immunologist was always at work as a visiting scientist in my department at NYU-Bellevue Medical Center. The ones I knew best were doctrinally pure Marxists, quite convinced that their society was on

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the right track and ours on the wrong, but we became good friends because of what was happening in our laboratories. Prague closed, and my friends have mostly dropped out of favor and out of sight. I wish it were not so, and it makes me melancholy to think that it may never happen again. Please fix it.

I have colleagues in other fields of biomedical science who tell similar stories about their own experiences with collaborators in Poland, East Germany, Hungary and Romania. Agricultural research is of special interest in Bulgaria. All such contacts have dwindled away in recent years, to the deprivation of science in general. We should be making a concerted effort to restore the connections, and I can see no risks of any kind, to either side in the cold war. I can appreciate, although with deep reservations, the governmental anxieties over the transfer of other kinds of conceivable military technological information, computers, materials chemistry, lasers and all that, but I cannot imagine any risks at all in a free exchange of immunology or molecular biology or neuroscience. What I can imagine, easily, is the creation of close, warm friendships among eager young people whose influence on future judgments in their respective societies may be decisive.

IV

I believe that international science is an indisputable good for the world community, something to be fostered and encouraged whenever possible. I know of no other transnational human profession—and I include here the arts, music, law, finance, diplomacy, engineering and philosophy—from which human beings can take so much intellectual pleasure and at the same time produce so much of immediate and practical value for the species. The problems that lie ahead for the world, endangering not only the survival of our kind of creature but threatening the existence of numberless other species, are proper problems for science. Not to say that science will find answers in time, simply that there is no other way to solve the problems.

Of these, the worst is the impending extinction of more biota than have ever been lost in geological time since the mass extinctions of the Late Cretaceous 65 million years ago, when 52 percent of the world's marine species vanished along with great numbers of terrestrial creatures, including all the dinosaurs. Something on this scale lies immediately ahead, perhaps within the next few centuries, unless man can find ways to avert it. If it occurs, it will be caused by the swarming of human beings over all other ecological niches, and the destruction of those niches. It will come as the result of the deforestation now in progress, the inevitable extension of agriculture everywhere in order to feed the increasing numbers of ourselves, and the simultaneously inevitable depletion of the earth's resources. I plan to deal with this matter in some detail in my third lecture, but I allude to it here because it is, at least in part, a problem for international science, and most urgent of all imaginable scientific problems.

I do not assert that science will solve it. On my blacker days I have a hunch that it is already endgame, beyond fixing. But it needs a try. It is a problem for biologists, even astrophysicists. Maybe especially this last lot, since they command the technology needed most for getting a sustained, close look from the outside at what is happening to our planet.

For work of this kind, in the interest of global habitability, we need a world community of scientists, and we need to have them *at* each other, talking incessantly, telling each other everything they know the moment they learn it.

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I have already noted that we have the beginnings of an international network, needing only the joining up of Soviet researchers and their colleagues in the Soviet satellite countries and the development of scientific enterprise in the emerging nations. It is in the nature of scientists who work at fundamental problems in nature to work together, to pass their information around. Now, I am obliged to pull up short of optimism, to acknowledge that what I would like to see happen may not happen at all or may be put off until too late. Some new things have begun to take place, just in the last few years, that may pull the network down.

There are just the faintest, earliest indications that something is about to go wrong. Nationalism may be about to make its appearance as an influence on basic research, a dead hand on science. The Europeans are talking about the need to create a Third Power, based on science, standing as a buffer and equal competitor between the two existing dominant empires. This is a grand idea, one that everyone should be in favor of, all depending on how the Europeans go about it. They seem to be saying that a United States of Europe is a possibility for science, even though it has not really been feasible for agriculture, steel, wine or other aspects of trade. I agree with this, and pray that it comes about.

But they are also talking, especially the French and the West Germans, about the need to "protect" European science, to stop the flow of free information to America where it becomes a source of enrichment for the United States. This means, from what the conversations I have been hearing sound like, the introduction of new constraints on research communication, confidentiality, secrecy, and thus an end to the kind of scientific gossip that has been moving science along. The British seem to be expressing similar concerns, having seen, too many times, the loss of their own basic research to development and profits in America. They will never forget penicillin. The French are convinced that there is a special French aptitude for a kind of science possible in no other culture, and they hope to lead Europe along their path. I am hearing more and more of what sound to my ear like anti-American sentiments, and they are beginning to come from the upper reaches of the European science policy establishment. I am apprehensive, still only mildly so, but worried for the future.

Another thing has been happening to basic biomedical research everywhere, and I do not know how it will come out. For the first time in the long history of biology, there is money to be made from science. The famous biological revolution is about to turn into an economic and industrial revolution. The recombinant DNA technology and the production of monoclonal antibodies are perhaps only two examples of what may lie ahead. The working scientists at their benches have suddenly discovered money, with which few of them ever had more than a nodding acquaintance in the past. Small corporations are sprouting in the vicinity of universities everywhere, issuing shares to their academic consultants, paying handsome salaries, converting a generation of people long resigned to living the lives of shabby curates into millionaires overnight, on paper anyway. Giant corporations in the chemical and pharmaceutical industry are beginning to invest huge sums in the basic science being done in universities and institutes, and the old arms-length, essentially adversary relationship between industry and the academy is now becoming a partnership.

I have been happy to see this happen, during a time when governmental funds for the support of basic research have been dwindling and are now being cut back. But I am beginning to worry about staying happy. So far, the terms of the

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new partnerships have seemed both enlightened and generous: the Hoechst and Dupont investments in molecular genetics and immunology at Harvard, for instance, are accompanied by written assurances that the companies will not have any say in what research is to be done in the laboratories; all that is asked for is a first look at the basic research as the results turn up in the laboratory notebooks. Licensing of a potential product is asserted to involve only minimal delays in publication, and all parties protest that there will be no need for secrecy, much less any gentleman's agreement on prolonged confidentiality. It makes good sense for the university to concentrate its attention on what it can do best in science, which is pure, undifferentiated basic research. It makes even more sense for industry to sponsor this kind of inquiry, since it is the long attested record that applied science and development cannot occur, ever, in the absence of fundamental information.

What worries me as an academic scientist is the money, much as I admire the direction of flow. I am concerned about what may be going on in the minds of the youngest investigators, people now working for their doctoral degrees and already looking around for postdoctoral opportunities. No matter what assurances they hear about the freedom of scientific inquiry in the university, about their sole mission to discover how nature works at a deep level, they are bound to have it somewhere in their minds that the surest way up the academic ladder will be to learn something useful, something with a chance of turning into a product. If this notion becomes the common one, driving the engine of science along, we may be about to enter a period when basic research will not be carried out for its own sake, out of pure curiosity, driven along by the imagination turned loose, but essentially controlled behind the scenes by money.

And if anything like this begins to happen, there goes the gossip and those long-distance telephone calls from New York to Basel, or Edinburgh to Melbourne. People long accustomed to telling colleagues everything they know, including everything they can guess at, may fall silent in the lobbies of international meetings. The scientific network around the world will then begin to fray and pop, and we will have lost the chance at a supranational community of amiable intelligences.

V

I hope these things can be prevented. The corporate world has as much at stake as does the world of science, and ought to be taking a very long, close look at the new arrangements. And governmental policymakers should be reviewing in detail the history of that most elegant and successful of all social inventions, the National Institutes of Health in Bethesda. It should not be forgotten that the early support by NIH of international research, with grants to laboratories in Paris, London, Cambridge, Melbourne and other places during the 1950s and 1960s, had a profound influence on the later development of both American and foreign biomedical science.

These days, very little NIH money is being invested in foreign laboratories. This may be as it should be, since other countries have now become interested in supporting their own basic biomedical research, and are quite capable of doing so for the long term. It is the *history* that needs remembering: the NIH had an important hand in the early construction of today's international network of the sciences concerned with human health. Any governmental agency that can do

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this sort of thing should be studied closely, and remembered for the future of international amity.

I said a while back that I could not imagine any security risks in the free international exchange of basic biomedical research data, in immunology, say, or in the new neurobiology, or in recombinant DNA research involving bacteria and viruses. The cold war, I was thinking, can never involve my fields of science in the way that is now deeply distressing to some of my cousins in basic physics, chemistry, holography, robotics and computer science. I was thinking that no agency head or commission in Washington is ever likely to urge the biologists to have a care about what they are publishing lest the information turn out to be useful to the Russians. I said that I could not imagine it, and this much is true. But just because I cannot imagine it doesn't mean that someone else will not cook up the notion, sometime in the future, especially if our international relations become even nastier than they are today. Someone will think of biological warfare, and out will come the cautionary memoranda, and we will be in the same boat with our colleagues in the harder sciences.

If I were a Soviet bureaucrat, envious over the stunning progress in fundamental research being made in the outside world, nothing would cheer me up more than to learn that the Western world is beginning to talk about the need for constraints on the communication of basic science. There are ways for governments to slow down research, by interposing too many committees, or by mandating more paperwork in the applications for support, or by trying to call all the shots in advance, predicting which fields in basic research are likeliest to turn out profitable in the future. Any of these can damage science, but only transiently. The one sure way of killing it off, surefire, once and for all, would be to make basic research a secret occupation. If ever the international frontiers are closed down, science will at that moment be dead on its feet.

HUMAN HEALTH AND FOREIGN POLICY

There are now approximately 4.5 billion members of our species alive, and sometime within the next half-century that number will be almost surely double. Something around one third of us, residing in modern, industrialized societies, enjoy what we should be calling reasonably good health, living out almost the estimated maximum life-span for normal human beings. The rest, the majority of mankind, the citizens of impoverished nations, have less than half a chance at that kind of survival, dying earlier and living miserably for as long as they do live, threatened by constant hunger and an array of debilitating diseases unknown to the lucky third.

The central foreign policy question embedded in these loose statistics is the obvious one: what should the relatively healthy 1.5 billion human beings be doing to bring the other three billion into the twentieth (or twenty-first) century? I shall take it as given that there is an obligation of some sort here.

It is, in the first place, a moral obligation, but one driven by deep biological imperatives as well as by our conventional, cultural view of human morality. We are, like it or not, an intensely, compulsively social species. The reason we have

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survived thus far, physically fragile when compared with most other mammals, prone to nervous unsettlement by the very size and complexity of our forebrains, and competitively disadvantaged by our long period of absolutely vulnerable childhood, is that we are genetically programmed for social living. I can no more imagine a solitary, lone human being, totally and permanently unattached to the rest of mankind, than I can envision a single termite making it through life on its own, or a hermit honeybee. What holds us together in interdependent communities is language, for which we are almost certainly as programmed by our genomes as songbirds are for birdsong.

I do not mean to suggest that we are very good at this, nor that we have been successful up to now. If that were the case, we would not have swarmed around the earth in our present dense masses, increasing our population by logarithmic increments up to today's risk of crashing, in the fashion of the last several centuries. We are fairly good at family life, allowing for the fact that some families drive their members, literally, crazy. Each one of us has a circle of close friends, trusted and even loved by them, and each of those friends has another circle, and you would think the expanding circles would extend in waves to include everyone, but it is not so.

We have succeeded in working out long periods of survival in tribal units, allowing for the tendencies of tribes to make war against each other. It was in the invention of nation-states that we began to endanger our place in nature, by the implicit violation of all rules of social interliving. Instead of developing as a homogeneous unit of social animals, like an expanding termitarium, we took to splitting into colonies of ourselves and now all of them have become adversaries. Some, by luck or geography or perseverance, have turned out to be rich and powerful, others dirt-poor and weak, and here we all are, in trouble. Mankind is all of a piece, a single species, and our present situation will not do.

The only excuse I can make for us is that we are new at the game and haven't yet learned it. It is a mistake to think that the cultural evolution of humanity has been in any way analogous to biological evolution. We haven't been here long enough to talk about our living habits in the terms used by paleontologists and geologists. In the long stretch of epochs called time by the earth scientists, the emergence and development of social humanity could have begun only a few moments ago. We are almost brand-new. It may even be a presumption to say that we are already a juvenile species. The life of the earth is almost four thousand million years, and the evolution of species is recorded in spans of many million years each.

II

Although we turned up in something like our present form around one million years ago, we probably did not become what we would call human until we acquired human speech. We do not know when language began, but there is evidence that this may only have happened when there were enough of us living in hunter-gathering or agricultural communities, a few-score thousand years ago, to permit critical masses of the children to be aggregated together and at each other. Derek Bickerton has discovered that the Hawaiian Creole language was strung together, with all its grammar and syntactical rules installed, by the young children of the multi-tongued plantation workers who were brought to the islands in the 1880s. When the language appeared, the adults could neither speak it nor comprehend it. This suggests a biological role for the children of

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our species, and a justification for the long duration of an otherwise unproductive period of life. We all know about the special gift that children have for learning language, but the possibility that they *make* language, and the derivative possibility that they may actually have carried the responsibility for inventing it in the first place, thousands of years and thousands of languages ago, is a new thing to think about. If we are held together as a social species by language, as I believe, and if human speech with its unique features of metaphor and ambiguity comprise for us the equivalent of an ecological niche on the planet, then a long childhood is, in strict Darwinian terms, of the greatest selective value for our species. And if this is so, the survival and health of our children is a biological imperative for the survival of our species as *homo sapiens*.

In another sense, we may all be going through a kind of childhood in the evolution of our kind of animal. Having just arrived, down from the trees and admiring our thumbs, having only begun to master the one gift that distinguishes us from all other creatures, it should perhaps not be surprising that we fumble so much. We have not yet begun to grow up. What we call contemporary culture may turn out, years hence, to have been a very early stage of primitive thought on the way to human maturity. What seems to us to be the accident-proneness of statecraft, the lethal folly of nation-states, and the dismaying emptiness of the time ahead may be merely the equivalent of early juvenile delinquency or the accidie of adolesence. It could be, as some are suggesting, that we will be killed off at this stage, that what we are living through is endgame; I do not know, but if so we will be doing it ourselves, and probably by way of nuclear warfare. If we can stay alive, my guess is that we will someday amaze ourselves by what we can become as a species. Looked at as larvae, even as juveniles, for all our folly, we are a splendid, promising form of life and I am on our side.

I would feel better about our prospects, and more confident for our future, if I thought that we were going to solve the immediate problem of inequity. It is one thing to say that some of us are smarter and more agile than others, more skilled in the management and enrichment of our local societies, therefore bound to be better off in living. It is quite another thing, however, to say that there is anything natural or stable about a world society in which two-thirds of the population, and all the children of that two-thirds, have no real chance at human living while those of us who are well off turn our heads away.

III

This is not the time, in today's kind of world, for me to be talking about equity in terms of the redistribution of the world's money, nor, surely, is this the place. Nor is this a matter that I possess qualifications for talking about, much less thinking about. But I do see the possibility, at least in technological terms, for doing something about the existing gross differences in the health of peoples in various parts of the earth. Moreover, I believe that this country, and the other countries like it in the so-called industrialized world, are under a moral obligation to do whatever they can to change these inequities, simply because we are members of a social species.

There are also, I suspect, obligations of a political nature, with substantial stakes of self interest in having a stable, predictable world. The disease problems in the undeveloped nations are, in part, the result of poverty and malnutrition, and these in turn are partly the result of overpopulation. But the problem turns itself around: the overpopulation is, in part, the result of the disease, poverty

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and malnutrition. To get at the situation and improve it, something has to be done about all of these, in some logical sequence. It is not one problem, it is a system of problems. To change it without making matters worse will not be easy. Making well thought-out changes in living systems, as Jay Forrester demonstrated for city models, is a dangerous business. Fixing one part, on one side, is likely to produce new and worse pathological events miles away on the other. The most dangerous of all courses is to begin doing things without even recognizing the existence of a system, and in this case a system in which all people, including the citizens of this rich country, are working parts.

If we should decide to leave matters roughly as they are, and to let nature simply take its course, it is hard for me to see how the future events can be politically acceptable, never mind morally. If a majority of human beings are to continue dying off before having a chance of life, succumbing to diseases that are, at least in principle, preventable, and in many cases dying of starvation with or without the associated diseases, this cannot be kept a secret. Television will be there, and as the disasters and the unhinging of whole countries of dying people become spectacular, the scrutiny by television will become closer and more continual. To say that this will have an unsettling effect on the viewing audiences in affluent countries is to understate the likely reaction. Meanwhile, the efforts will intensify among the billions of afflicted people to get out of wherever they are and to cross borders into any place where they can sense food and a hope of survival. Those left behind will continue the tropical deforestation already in progress, extinguishing immense ecosystems upon which other species are dependent and causing global climatic changes beyond predicting, jeopardizing the very life of the planet.

The greatest danger of all is in our own response. Having let nature take its course, we may someday decide that the problem has become insoluble, that the people knocking at our doors with hands outstretched have become enemies at our gates, who can only be coped with by the traditional method of killing them. This scenario is by no means unthinkable, not after this kind of century. We might even persuade ourselves that this is natural behavior, in aid of the whole species. Other kinds of animals, less equipped with brains and technologies than we are, take steps of their own to reduce their numbers by "crashing" from time to time. A crash is a jargon term used by the ecologists for the catastrophic events which follow, inevitably, when any species has overreached itself, outnumbered the sources of food in its ecological niche and overgrown its allotted space on the planet. But other creatures, the "lower" animals as we like to call them, do not crash selectively, they crash all at once, all together.

Within another century it is likely that we will have swarmed everywhere, pole to pole, covering almost every liveable acre of land-space and water-space. Some people are even talking seriously of space-space, theorizing about the possibility of launching synthetic cities and countrysides enclosed in huge vehicles to sail the galaxy and perhaps colonize other celestial bodies.

IV

What, on a necessarily limited scale, can we do? Specifically, what should we be planning for the improvement of the health of the masses of people who are now condemned by circumstance to lives that are, in the old phrase, nasty, brutish and short? Is it possible to do anything, without running the risk of still another expansion of the human population? If people everywhere could become

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as reasonably healthy as we are in the United States, with birth rates and death rates approximately the same as ours, would the world become intolerably overpopulated? Considering the alternative—a massive population explosion already under way and beyond control, based in large part on the reproductive drive among people now deprived of almost everything except reproduction itself—I am not at all sure. It seems to me worth a try, and I am unable to imagine any other course of action.

When we in the Western world use the word "health," we mean something considerably more than survival and the absence of incapacitating diseases. To be healthy, we count it necessary to be happy and rich as well. But for the present discussion, I prefer to keep to the old-fashioned meaning.

Let us assume, in a flight of imagination, an economic state of affairs in which it is financially possible for the richer countries to export replicas of their entire technology of medical care to the poor nations. This would involve, I suppose, prefabricated versions of the Massachusetts General Hospital and Memorial Sloan-Kettering Cancer Center, to be installed in every major city in middle Africa, Asia and South America, plus their professional staffs, plus duplicates of any top-drawer, accredited American medical school. And money enough to sustain these enterprises for, at the least, a period of 25 years.

I believe the net effect of this munificence would be zero, or something less than zero. The affluent and influential members of whatever establishment exists in the local bureaucracy would doubtless enjoy the new institutions, and would save the air fares now needed to fly them to hospitals in London or New York. But the masses of people, especially those crowded into the slums or still living out in rural areas, would be entirely unaffected, or perhaps even adversely affected because of the investment of all available funds on technologies totally inappropriate to their health problems.

We are worlds apart. In our kind of society, today's enormously expensive health care system was put together in the decades following World War II primarily to cope with the medical concerns of people in their middle years and old age. The improvements in the general health of our populations, which began in the nineteenth century, had by this time reached such a high level that premature death had become less of a genuine day-to-day event and more of a nagging, and to some extent, a neurotic anxiety. Our attention is focused on such diseases as cancer, heart disease and stroke; we do not have to worry about dying early from the things that are killing most people every day in the Third World.

There is no question that our health has improved spectacularly in the past century, but there is a running argument over how this came to be. One thing seems certain: it did not happen because of medicine, or medical science, or the presence of doctors.

Much of the credit should go to the plumbers and engineers of the Western world. The contamination of drinking water by human feces was at one time the single greatest cause of human disease and death for us; it remains so, along with starvation and malaria, for the Third World. Typhoid fever, cholera and dysentery were the chief threats to survival in the early years of the nineteenth century in New York City, and when the plumbers and sanitary engineers had done their work in the construction of our cities these diseases began to vanish. Today, cholera is unheard of in this country, but it would surely reappear if we went back to the old-fashioned ways of finding water to drink.

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But long before plumbing, something else had happened to change our health prospects. Somehow, during the seventeenth and eighteenth centuries, we became richer people, here and in Europe, and were able to change the way we lived. The first and most important change was an improvement in agriculture and then in human nutrition, especially in the quantity and quality of food available to young children. As our standard of living improved, we built better shelters, with less crowding and more protection from the cold.

Medicine was only marginally involved in all this. Late in the nineteenth century the role of microbial infection in human disease was discovered, epidemiology became a useful science, chlorination of our water supplies was introduced, and quarantine methods were devised to limit the spread of contagions. The doctors had some voice in these improvements, but they did not invent the technologies. Medical care itself—the visits by doctors in the homes of the sick and the transport of patients to hospitals—could have had no more than marginal effects on either the prevention or reversal of disease during all the nineteenth century and the first third of the twentieth. Indeed, during most of the centuries before this one, doctors often made things worse whenever they did anything to treat disease. They bled seriously ill patients within an inch of their lives and sometimes beyond. They administered leeches to draw off blood, spread blistering ointments over all affected parts of the body, purged the bowels with toxic doses of mercury, all in aid of eliminating what they called congestion of diseased organs, a figment of Galen's first century A.D. imagination.

In retrospect, there is nothing puzzling about the stunning success of homeopathy when it was introduced by Hahnemann in the mid-nineteenth century. Homeopathy was based on two notions, neither of them supported by any kind of science, both pure speculation on Hahnemann's part. The first was what he called the *Law of Similars*, that "like cures like." If a drug caused symptoms resembling those of a disease, fever or vomiting for example, then that drug should be used for treating that disease. But it was his second notion that assured his success and that of his practice: the drugs should only be given in fantastically small amounts, diluted out to one part in ten billion or more. In effect, homeopathic therapy was no therapy at all beyond reassurance, and a great many patients were thus protected against the conventional medicine of the day. No doubt they felt much better, and had a considerably improved prospect of recovery.

It was not until the early twentieth century that anything approaching rational therapy emerged for human disease, and it was not until the middle of the century that we came into possession of rational and powerful technologies for the treatment and prevention of infection on a large scale. Now that we have them, they are blessings indeed. We no longer need worry, as everyone did when I was a medical student, about tuberculosis. At that time, in the 1930s and 1940s, people in this country were frightened by tuberculosis as they are now fearful of cancer. When tuberculosis occurred in the very young and the very old, the diagnosis was a flat death sentence. We no longer live in fear of tertiary syphilis, which once filled more beds in the insane asylums than schizophrenia; I have not heard of a case of brain syphilis in a New York medical center in the last 15 years. We probably got rid of tertiary syphilis, by the way, not by the skill of public health departments but because of the overuse of penicillin by practicing physicians; it was a sort of accident; by creating a virtual aerosol of penicillin across the land for treating upper respiratory infections, in which penicillin has

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no real effect, we probably wiped out most of the latent spirochaetes in the tissues of infected people. We still have acute primary syphilis, of course, but the elimination of teriary disease was an absolute triumph for the country's health.

In the same way, partly by accident and the overuse of antibiotics, acute rheumatic valvular disease, which was once the dominant form of heart disease in our society, has almost disappeared.

Pneumonia is no longer the death threat for young and middle-aged people that it was 50 years ago.

And surgery has been transformed as a profession. Simultaneously with the development of antibiotic therapy—and in large part because of it—surgery underwent a comparable revolution. In the years since, surgical techniques have become vastly more sophisticated and powerful. Along with the control of infection, the surgeons have learned enough about maintaining blood volume and electrolyte balance so that open-heart surgery, organ transplantation, the repair of minute blood vessels, the replacement of severed limbs, and extensive procedures for the removal of cancers once considered unapproachable, have become everyday, routine procedures.

Now, can we package all this technology up, and send it along to the impoverished nations? Should we? Would it be useful, or as the phrase has it these days, would it be cost-effective? I think not.

V

I believe that what is needed for the health of Third World societies is the same base of general hygiene that was put in place in America and Europe before the introduction of modern medicine. Unless this is done first, the adding on of our highly expensive and sophisticated technologies simply cannot work.

The people who are dying prematurely in Central and South America, and in most of Africa, and large parts of Asia, have a different set of problems. They must raise their families in the near-certainty that half or more than half of their children will die in infancy and early childhood, and accordingly they produce as many as they can as early as they can. The losses are mostly due to diarrheal diseases, caused by contaminated water supplies and by faulty hygiene. The vulnerability of young children to lethal infections is enhanced by inadequate food, and to some extent as well by inadequate information about the selection of food for young children.

Aside from the infant and child mortality from infection and malnutrition, the major health problem for people living in tropical and subtropical regions is parasitic disease.

Here is a set of health problems for which this country can really make itself useful, and may indeed be in the process of doing so. We can perhaps do a certain amount in helping to provide today's methods for the prevention and treatment of parasitic disease, but I am obliged to say quickly that these technologies are only marginally effective at their best, and they involve formidable logistical problems in getting them into the regions where they are needed. There are even more difficult obstacles—bureaucratic, cultural and financial—in seeing to it that sick people actually receive them. We should be trying harder, even so, to do what we can to help.

We should not be trying to transport our high-cost, middle-class, middle-age and geriatric health care systems to our poor neighbors to the south, nor to their poor neighbors in Africa and Asia. They cannot cope with the high and still

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escalating costs of our kinds of high technology, nor is it what they really need at this stage. Our system, at its present stage, is designed to assure our citizens a chance at old age. What they hope for is a better chance at life itself. If we want to be useful, as we should, we ought to find ways to transfer another kind of governmental instrument which was, in our own laboratory, essential for our protection against contagion, malnutrition and ignorance about health. This was the local health department as we had it during the late nineteenth through the first half of the twentieth century.

By this time, our own local health departments have shrunk to vestigial organs, run out of things to do, and may be at the edge of extinction. But organizations like these, when they were working at top speed and had more missions than they could possibly cope with, are precise models for what an underdeveloped country needs. Not the typical, highly centralized bureaucratic ministry in the capital city, not even the partly decentralized but still too large organizations resembling our state health departments. What I am talking about is the small, old-fashioned Board of Health, as local and autonomous as possible, overseeing at first hand the health affairs of a county, a town or a string of villages. These are instruments that have really worked in our own past.

A few countries in Africa already have networks of organizations somewhat like these, but they are generally underfunded and understaffed by adequately trained personnel. More centers are needed, and the means would readily be found for providing the professionals to do the work and to train up a cadre of local professionals. This, I suggest, is where we might come in. We have not forgotten how to manage a local health department, and we have the people who understand the business.

They are the nurses. The profession of nursing was founded by energetic young women who learned how to handle most of the problems that bring patients to a doctor's office or a hospital clinic. Many of these people, around the turn of the century, left the hospital setting and established themselves in the poorest neighborhoods of our cities. They were called public health nurses, or visiting nurses. Their professional descendants are still being trained (better trained, indeed, than ever before), and are called nurse practitioners or physicians' assistants, attracting now some highly motivated young men as well as women.

If our government *does* intend to be helpful to its impoverished neighbors in the field of health, I do not believe that deploying American-trained physicians and surgeons in large numbers will meet the needs of foreign societies, even if it could be done. The real health problems are, in a sense, too fundamental for the products of our medical schools, most of them trained at very high cost for at least 12 years in universities and teaching hospitals before being certified, elaborately armed with medicine's highest technologies and aimed toward specialty practices. Very few of these people are either professionally or temperamentally prepared to cope with the day-to-day health problems of an impoverished and primitive society.

Nurses, by and large, come into their profession because of a straightforward ambition to be useful and helpful, and they hope to do this by simply "looking after" people who need them. With two or three years of nursing education (usually laid on these days after two years of undergraduate college education), they can take on the role once played by old-fashioned family doctors in our own rural communities, and they can do some things a good deal better. They can

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educate people who lack any understanding of hygiene and nutrition, they can organize systems for immunization of whole communities, and they can diagnose, or learn to diagnose, the endemic diseases of the region. When new drugs become available for the treatment or prevention of parasitic diseases, it is nurses who will be best-equipped to see to it that they are properly employed in the field. They are perfectly capable of diagnosing and treating the common bacterial infections with the appropriate antibiotics.

The nurses in this country are also obliged, in the course of their training and early professional experience, to become good administrators. As a physician, I would have no qualms at all in seeing the nurses take charge of the running of local health departments.

Hospitals are needed as well, of course, but not on anything like the scale in this country or Europe. A modest-sized network of small regional hospitals, designed after the fashion of Scotland's cottage hospitals, would be valuable if staffed by a limited complement of physicians and surgeons. Some of these professionals already exist in the countries concerned, and more could be trained in this country if we would turn our minds to it. The present difficulty is that they lack hospital opportunities and adequate incomes in their own countries, and tend to emigrate whenever the opportunity presents itself. An investment in hospital construction and maintenance is obviously necessary, but only on a small scale compared with what we do in this country.

These are what are needed: sanitation, decontaminated (or better still, uncontaminated) water supplies, antibiotics and vaccines, and a distribution system assuring access to these things throughout the population, a chance at access to whatever new agents turn up for treating parasitic infections, plus a network of small hospitals with professional competence in primary medical care, plus a corps of visiting nurses, all of it run by nurse practitioners and physician's assistants trained at the outset in this country and its affluent neighbors—to be later replaced or succeeded by similarly trained nurses from within the developing nations. These are the basic requirements for raising the standards of public health.

It must seem that what I am asking for is a new version of the Peace Corps, but one that must be considerably larger, drawing its professionals from all industrial nations rather than just the United States, and concentrating its attention on hygiene, infectious diseases and nutrition. China has a health care system somewhat like this, already in place.

The rewards for the professionals are there to see, and I need not dwell on them. It is not given to many young people to feel useful in society, and this is incentive enough for those chosen to serve overseas. But the nursing profession is in trouble here at home because of the derisory salaries paid, and to bring more bright young people into nursing schools from high schools and colleges will take more money than we have thus far been willing to pay. This is as true for Europe and the United Kingdom as here at home.

So, one obstacle to what I hope to see happen is money, but it is not a vast sum considering our other expenditures on our connections with the Third World, from defaulted loans to military apparatus. Money, in any case, is not the chief problem.

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VI

Our real contribution to the parasitic disease problem, for which we already possess the facilities and talent needed, will be in research. All of the diseases in question represent problems which are essentially unsolved, beyond knowing the taxonomic names of the parasites involved. Our methods for dealing with parasites are really quite primitive when compared with the technologies we have for treating and preventing bacterial and virus infections. Many of the chemicals commonly employed are nearly as toxic for the host as for the parasite, and the few effective ones—such as the current antimalarial drugs—are agents which the parasites quickly learn to resist. There is an enormous amount of pharmacologic and immunologic work still to be done.

The sheer numbers involved in the burden of parasitic disease seem overwhelming. Amebiasis affects ten percent of the world's population, most of it in the South. The population at risk from malaria exceeds 1.2 billion, with an estimated 175 million people actively infected today. African trypanosomes (the cause of sleeping sickness) and American trypanosomiasis hold 70 million people at risk, and infect about 20 million right now. Schistosomiasis, worldwide, afflicts no less than 200 million people, filariasis and Leishmaniasis 250 million, hookworm 450 million, onchocerciasis, a common cause of blindness in the tropics, 20 million.

One thing that should catch the eye immediately in this list of numbers is that these are not mortality figures, but morbidity statistics. The actual deaths that are caused each year by these diseases represent a very much smaller number—probably no more than one million deaths a year for malaria in all of Africa, for example. The disease burden is not so much a *dying* problem for the poor of the world, it is the problem of living on for a somewhat shortened life span with chronic, debilitating, often incapacitating disease. Trachoma does not kill patients, but blinds more than 20 million. There are about 15 million people with leprosy, one of the most chronic of all diseases. Malaria and schistosomiasis, which between them affect a billion and a half of the world's population, are vastly more important because of the human energy that is drained away each year than because of the lives lost.

This provides an answer, of sorts, to the question I raised earlier: will solving the disease problem in the developing nations simply increase their populations to intolerable levels and make matters worse? It is probably not so. What might be accomplished would be the prospect of reducing the incidence of chronic invalidism, and vastly increasing the energy and productivity of billions of people.

Rough calculations can be made of the human energy costs entailed in certain diseases. A single day of malarial fever consumes more than 5,000 calories, for example. It has been estimated that this one disease represents a loss of about 20 percent of the total energy yield from grain production in the societies affected.

For many years, parasitic diseases have been thought of as problems unapproachable by real science, only to be dealt with by empirical and often exotic therapies. This view is changing rapidly. The cell biologists have recently learned how to cultivate malarial parasites, the immunologists are fascinated by their surface antigens, and the molecular biologists are now about to clone the genes responsible for the surface markers by which the parasites protect themselves against the infected human host. This means that a vaccine against malaria can now be thought of as an entirely feasible prospect for the near future.

The trypanosomes are becoming objects of fascination in contemporary ge-

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netics research because of their remarkable capacity to change their surface antigens whenever the host begins to mobilize an immune response, and the genes responsible for these evasions are already being studied at first hand. If a vaccine to prevent trypanosome infection in humans and farm animals can be devised, thus eliminating African sleeping sickness, this step alone would open up for agriculture a fertile African area the size of the United States which is now uninhabitable. My guess is that parasitology will soon become one of the most active fields in advanced biomedical science, and we should soon be finding ourselves in possession of an array of brand-new technologies for both immunization and treatment.

Basic research on tropical infection and parasitism will be of enormous benefit for the health, welfare, survival and economic productivity of the impoverished countries, but there is another area of science which can be of equal importance in the long term. We are just entering a new scientific frontier in agriculture, thanks to the recent advances in molecular genetics and the recombinant DNA technique. There is now a real possibility that genetic manipulation can be used to transform the stress tolerance and disease resistance of current crops and grasslands. It has been predicted by Frank Press, president of the National Academy of Sciences, that "some 40 percent of the world's uncultivated but potentially productive land can be brought into production," if fundamental problems in plant genetics can be solved.

Here is also an opportunity for the Third World nations to begin developing their own science base in biological science and biotechnology. This matter has been the subject of a wrangling debate within the United Nations Industrial Development Organization. At a meeting in Madrid in early September 1983, ministerial delegates from 25 countries formalized an agreement creating, on paper, an international center for research and training in biotechnology, but they were unable to agree on a site for the center. India, Pakistan, Thailand, Tunisia, Bulgaria, Italy, Spain and Belgium each proposed themselves as host countries. The discussion broke down in an argument over the question of the attractiveness of the center's location to world-class scientists. There was the predictable polarization: the representatives of the Third World countries insisted that the center should be based somewhere in their region, while the American, British, French, West German and Japanese spokesmen were uniformly negative. The name of the center was agreed upon, but little else: it will be called the International Center for Genetic Engineering and Biotechnology.

I should think that the dispute could be made less political and more scientific if the objectives of the proposed center were narrowed down and focused sharply on one high priority area of research. There is little need in the Third World, at the moment anyway, for a major biotechnology research installation doing research and development on genetic engineering across the board. The manufacture for profit of products like growth hormone, interferon, insulin or industrial enzymes is unlikely to be of much use to the economies of such societies. On the other hand, the application of genetic manipulation to agricultural research would be directly relevant. Moreover, the logical place to do this work would be in the regions of the planet where, for a variety of reasons, agriculture is technically infeasible or inadequate. The potential crops and feed animals to be improved exist in India and Africa, not in Belgium.

Indeed, rather than having just one center in a single impoverished country, it would be more useful to set up a network of collaborating agricultural research

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centers in various countries of the Third World. The problems in agricultural research have become of engrossing intellectual interest to many scientists throughout the industrialized world, and I have no doubt as to the feasibility of recruiting investigators to centers where the regional problems are both novel and urgent. Indeed, there is already an informal establishment of excellent Third World scientists trained in Europe and the United States who have expressed enthusiasm for the installation of biotechnology centers in their home countries, and who are confident that these institutions can, in time, become centers of excellence. It is a very different thing from the past (and failed) attempts to introduce heavy industrialization in hopes of transforming a poor country's economy. The scientific improvement of agriculture, and as a result, the transformation of a society's nutrition, has a greater potential for the improvement of human health than any other aspect of modern technology.

In conclusion, the objection usually cited against proposals of this sort, privately if not publicly, is that the survival assured to more children and the longer life span assured to more adults could abruptly increase the population beyond the resources of any conceivable food supply. I do not believe this. My guess is that populations given some confidence that living itself is possible, and that live children are possible, would be stabilized as never before in their histories. With luck, birth control could be accepted as a necessity for living (as it is now in China) and the present disastrous upswing in population might begin to level off. Without such a change in basic health standards, the curves will surely keep ascending, straight up until the final crash. It is worth the risk, I believe, and more than worth the relatively modest investment of money and talent from our side.

But my final argument, in my last ditch, is the simplest, most primitive and perhaps least persuasive of all in terms of foreign policy. We *owe* it. We have an obligation to assure something more like fairness and equity in human health. We do not have a choice, unless we plan to give up being human. The idea that all men and women are brothers and sisters is not a transient cultural notion, not a slogan made up to make us feel warm and comfortable inside. It is a biological imperative.

SCIENCE AND THE HEALTH OF THE EARTH

We are not finished with great extinctions. The current anxiety in some biological quarters is that the next one may be just ahead, and will be the handiwork of man.

At a national meeting of biologists and biogeographers held in Arizona in August 1983, the history and dynamics of extinction were the topics of discussion. The consensus was that the number and diversity of living species may be on the verge of plummeting to a level of extinction matching the catastrophe that took place 65 million years ago, and that this event will probably occur within the next 100 years and almost certainly before 200 years.

It will be caused, when it occurs, by the worldwide race for agricultural development, principally in the poorer countries, and by the appalling rate of

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deforestation. Although tropical forests cover only around six percent of the earth's land, they harbor at least 66 percent of the world's biota, animals, plants, birds, and insects. They are currently being destroyed at the rate of about 100,000 square kilometers per year. Elsewhere on the planet, urban development, chemical pollution, especially of waterways and shoreline ecosystems, and the steady increase in atmospheric carbon dioxide are posing new problems for a multitude of species.

The animal species chiefly at risk for the near term is humankind. If there is to be a mass extinction just ahead, we will be the most conspicuous victims. Despite our vast numbers, we should now be classifying ourselves as an immediately endangered species, on grounds of our total dependence on other vulnerable species for our food, and our simultaneous dependence, as a social species, on each other.

But do not worry about the life of the earth itself. No extinction, no matter how huge the territory involved or how violent the damage, can possibly bring the earth's life to an end. Even if we were to superimpose on the more or less natural events now calculated to be heading toward a mass extinction the added violence and radioactivity of a full-scale, general nuclear war, we could never kill off everything. We might reduce the numbers of species of multicellular animals and higher plants to a mere handful, but the bacteria and their resident viruses would still be there, perhaps in greater abundance than ever because of the expanding ecosystems created for them by so much death. The planet would be back where things stood a billion years ago, with no way of predicting the future course of evolution beyond the high probability that, given the random nature of evolution, nothing quite like us would ever turn up again.

If the ecologists are right in their predictions, we are confronted by something new for humanity, a set of puzzles requiring close attention by everyone. It is something more than an international problem to be dealt with by the specialists in each nation who deal with matters of foreign policy. Human beings simply cannot go on as they are now going, exhausting the earth's resources, altering the composition of the earth's atmosphere, depleting the numbers and varieties of other species upon whose survival we, in the end, depend. It is not simply wrong, it is a piece of stupidity on the grandest scale for us to assume that we can simply take over the earth as though it were part farm, part park, part zoo, and domesticate it, and still survive as a species.

Up until quite recently we firmly believed that we could do just this, and we regarded the prospect as man's natural destiny. We thought, mistakenly, that that was how nature worked. The strongest species would take over. The weak would be destroyed and eaten or used in other ways, or pushed out of the way. Nature red in tooth and claw. All that. We are about to learn better, and we will be lucky if we learn in time.

II

Getting along in nature is an art, not a combat by brute force. It is more like a great, complicated game of skill.

Altruism is one of the strange biological facts of life, puzzling the world of biology ever since Darwin. How can one explain the survival of any species in which certain members must, as a matter of routine, and under what appear to be genetic instructions, sacrifice their own lives in the interests of the group? At

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first glance, the theory of natural selection would seem to mandate the permanent elimination of any creatures behaving in this way.

Altruism is on its face, a paradox, but it is by no means an exceptional form of behavior. It is extremely interesting to biologists, but not because it is freakish or anomalous. In most of the social species of animals altruism is essential for continuation of the species, and it exists as an everyday aspect of living. It is seen in its most outlandish form in the social insects, where the hive or nest depend for their survival on outright suicide. The sting of a worker honeybee is a barbed spear, and in the act of stinging a predator the bee is necessarily eviscerated. Among the colonies of termites, wasps and ants there are hordes of volunteers ready to rush out in defense of the group, getting themselves killed in the act. It seems like unselfish behavior, hard to explain in terms of the individual insect, but it makes good sense for the species.

Haldane was the first to perceive the genetic mechanism underlying this kind of altruism. Briefly put, the creature sacrificing itself for the group is actually acting in aid of the survival of its own genes, and the extent of this peculiar kind of survival is determined by the degree to which these genes are shared by other members of the group. As Haldane put it, "I would give up my life for 2 brothers or 8 cousins." W.D. Hamilton, years later, turned the intuition into a consistent mathematical formulation, the theory of *inclusive fitness*, which not only accounts for the survival of the individual altruist's genes but, more important for the evolution of this kind of behavior, predicts the spread of genes for altruism throughout the population.

Altruism is perhaps not so much an everyday aspect of human behavior, and there is no way of proving or disproving a genetic basis for its display when it does occur. Sociobiologists, E.O. Wilson for example, believe that human altruism is genetically governed and exists throughout our species, whether or not in latent or suppressed form. Others, the anti-sociobiology faction, do not believe there is any evidence for altruistic genes at all, and attribute behavior of this kind solely to cultural influences. They do not, of course, deny the existence of human altruism, they simply deny that it is a heritable characteristic. For all I know, either side of the argument could be right, but I would insert a footnote here with the reservation that human culture itself is not all that non-biological a phenomenon. We may not be inheriting genes for individual items of cultural behavior, but surely we are dominated by genes for language, hence for culture itself, whatever its manifestations.

Altruism remains a puzzle, but an even deeper scientific quandary is posed by the pervasive existence of cooperative behavior, all through nature. To explain this we cannot fall back on totting up genes and doing arithmetic to estimate the evolutionary advantages to kinships. And yet it is there, and has been since the beginning of life. The biosphere, for all its wild complexity, seems to rely more on symbiotic arrangements than we used to believe, and there is a generally amiable aspect to nature that needs more acknowledgement than we have tended to give it in the past.

This would be an impossible intellectual situation for biologists, especially the evolutionary biologists, if it were simply left there unexplained. Now, thanks to some work with computers by Axelrod and Hamilton, we can be persuaded that cooperating is not only a nice thing to do, it is *the* thing if you are looking for ways to get through very long stretches of evolutionary time in the presence of numberless other creatures with whom you are obliged to interact.

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Axelrod designed a computer game, a modification of the well-known iterated Prisoner's Dilemma game. The game allows the players to achieve mutual gains from cooperating, but also provides for the possibility that one player will exploit the other by cheating, thus increasing his gain, or the third possibility that neither will cooperate, thus gaining nothing for either side.

The plain existence of cooperation in nature raises three important questions for evolutionary theory: Can cooperation be a successful strategy when applied in a situation where there are multiple encounters over time between two players, and if so, is there a particular stratagem more successful than others? Second, in genetic terms, how could cooperation have started out in the first place? And, third, how could genes for this type of behavior be selected for, in conventional evolutionary terms?

When two players are given a choice between cooperating and defecting, and if they encounter each other on only one occasion in contesting for a prize—food, say, or space, or reproductive success—there is no question as to the advantage of defecting. No computer game is needed for arriving at that conclusion. Intuitively, and also in accordance with game theory, cheating pays, once anyway.

But intuition cannot be applied to the problem of what happens in the case of many encounters. Axelrod conducted a tournament by mail in 1979, sending out requests to some experts in game theory for computer programs to be matched against each other in a game in which cooperating and cheating were to be the sole choices.

Axelrod then played fifteen entries against each other, including a variant game of his own which involved flipping a coin on each move: heads for cooperating, tails for cheating. Each candidate program was played against every other program, including an exact duplicate of itself, 200 times.

The hands-down winner was also the shortest and simplest, a strategy devised by Anatol Rapaport at the University of Toronto. This program, designated by the capital letters that have become a standard part of computer jargon, is called TIT FOR TAT, and the name is entirely appropriate. Nothing could be simpler: the player cooperates on his first move, and thereafter he copies whatever the other player does.

When played out over a sufficiently long period of time, and with enough other players with different programs, TIT FOR TAT defeats all other strategies. It does not win all of the time, but with enough opponents it wins most of the time, and in nature that is real winning. Other programs were set up to be tricky, inserting clever moves to gain an advantage by single, unpredictable shots at cheating here and there in the course of the game, cooperating most of the time but taking the tiniest chances at betrayal. All of these programs lost the game, through what seems to have been the mathematical equivalent of a breakdown of trust. Since the point of the game is that each player has something to gain at each move by playing it, to end the game is to lose it.

Success of a single program in a computer game should not, I suppose, be extrapolated all the distance I would like to take it. But it is, at the least, a small item of comfort to learn that being nice in nature, most of the time, is a successful strategy. Not, mind you, being nice all the time, only nice in return for nice behavior by another. The long-term winners in evolution, indeed the whole animal kingdom and all the other great families of living things, seem to me to behave in this way, with the conspicuous exception of ourselves. Thus far in the

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evolutionary history of our species, in our assemblages as nation-states, in our dealings with all the other life forms as well as each other, we have tended to exploit, to cheat whenever the occasion seems to provide a short-term advantage from cheating, and—our worst mistake—to ignore the fact that it is bound to be a long, long game. For a computer to tell us this is not, in my view, artificial intelligence, it is intelligence, the real thing.

We are not bound by our genes to behave as we do. Most other creatures—not all, surely, but most of them—do not have the option of introducing new programs for their survival, at will. They behave as they do, cooperate as they generally tend to cooperate, in accordance with rigid genetic specifications. It may be, probably in fact is, that we are similarly instructed, but only in very general terms, with options for changing our minds whenever we feel like it. Our options, and our risks of folly, are made more complicated by the possession of language. Using language makes it easy for us to talk ourselves out of cooperating, but the very changeability of our collective minds gives us a chance at survival. We can always, even at the last ditch, change the way we behave, to each other and to the rest of the living world. Since the time ahead cannot any longer be counted as infinite time, and since we tend to keep talking by our very nature, perhaps we still have time to mend our ways.

III

There are two immense threats hanging over the world ecosystem. Both of them are of our doing, and if they are to be removed, we—humankind—will have to do the removing.

The first is the damage to the earth we have already begun to inflict by our incessant demands for more and more energy. Although we have not yet changed the earth's climate, it is a certainty that we will do so sometime within the next two centuries, probably sooner rather than later. We are not only interfering with the balance of constituents in the atmosphere, placing more carbon dioxide there than has ever existed before by the way we burn fossil fuels and wood, risking several degrees of increase in the mean temperature of the whole planet. We are also risking a significant depletion of the thin layer of ozone in the outer atmosphere, principally by the nitrogen oxides associated with pollution. It is a telling example of the way we think about global problems that we always talk of the ozone layer as our own personal protection against human skin cancer, as if nothing else mattered. The ecological outcome of a significant depletion of the ozonophere would matter considerably more. A 50-percent increase in the ultraviolet band would increase the amount of UV-B at the higher energy end of the band by a factor of about 50 times. The energy of these wavelengths would have highly destructive effects on plant leaves, oceanic plankton, the immune systems of many mammals, and could ultimately blind most terrestrial animals.

We ought to be learning much more than we know about the day-to-day life of the earth, in order to catch a clearer glimpse of the hazards ahead. One way to begin learning would be to make better use of the technologies already at hand for the world's space programs. Somewhere on the list of the National Aeronautics and Space Administration's projects for the future is the so-called Global Habitability program, a venture designed to make a close-up, detailed, deeply reductionist study of the anatomy, physiology and pathology of the whole earth. The tools possessed by NASA for this kind of close, year-round scrutiny are flabbergasting, and better ones are still to come if the research program can be

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adequately funded. Already, instruments in space can make quantitative records of the concentrations of chlorophyll in the sea—and by inference the density of life, the acre-by-acre distribution of forests, fields, farms, deserts and human living quarters everywhere on earth, the seasonal movements of icepacks at the poles and the distribution and depth of snowfalls, the chemical elements in the outer and inner atmosphere, and the upwelling and downwelling regions of the waters of the earth. It is possible now to begin *monitoring* the planet, spotting early on the evidences of trouble ahead for all ecosystems and species, including ourselves.

The Global Habitability program could become an example of international science at its most useful and productive, if it could only be got under way. Right now, the chances of getting it set at the high priority it needs for funding seem slim. It has the disadvantage of offering only long-term benefits, which means political trouble at the outset. It is no quick fix. It is research for the decades ahead, not just the next few years. And it cannot be done on the cheap, which means wrangles over the budget in and out of Congress. And finally, it will require a full-time, steady collaborative effort by scientists from many different disciplines in science and engineering, and from virtually every country on the face of the earth, which means international politics at its most difficult. But it ought to be launched, and soon, no matter what the difficulties, for it would be a piece of science in aid of the most interesting object in the known universe, and the loveliest by far.

IV

I said a moment ago that there were two great threats to the planet's viability as a coherent ecosystem. The second one is not a long-term one. It hangs over the earth today, and will worsen every day henceforth. It is thermonuclear warfare.

It is customary to estimate the danger of this new military technology in terms of the human lives that are placed at risk. We read that in the event of a full-scale exchange in the Northern Hemisphere, involving something around 5,000 megatons of explosives, perhaps one billion lives would be lost outright from blast and heat and another 1.5 billion would die in the early weeks or months of the aftermath. With more limited exchanges, say 500 megatons, the human deaths could be correspondingly reduced. We even hear arguments these days over the acceptable number of millions of deaths that either side could afford in a limited war without risking the loss of society itself, as though the only issue at stake was human survival.

But a lot of other things would happen in a thermonuclear war, more than the general public is aware of or informed about. What we call Nature is itself intimately involved in the problem.

According to a study by a committee of biologists and climatologists for the Conference on the Long-Term Biological Consequences of Nuclear War, recently published in *Science*, the following are among the probable events that will

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occur.[1] Some of these were made public on television in October, attracting a certain amount of what I fear will be transient public concern.

Assuming that most or all of the detonations take place at ground level, the amount of dust and soot exploded into the atmosphere will darken the underlying earth over the entire Northern Hemisphere for a period of months to one year. The sunlight will be 99 percent excluded, and the surface temperatures in continental interiors will fall abruptly to below -40°C, effectively killing most plants and all forests. In the tropical zones, the loss of forests will destroy a majority of the planet's species. The photosynthetic and other planktonic organisms in the upper layers of the oceans will be killed, and the foundation of most marine food chains eliminated.

The new and extensive temperature gradients between the oceans and land masses will bring about unprecedented storms at all coastal areas, with destruction of many shallow-water ecosystems.

Radioactive fallout in areas downwind from the fireballs is estimated to expose five million square kilometers to 1,000 Rads or more, most of this within 48 hours. This exposure is much higher than in any previous scenario, and is enough to kill most vertebrates and almost all forms of plant life in the affected area, including the conifers that comprise the forests in the cooler regions of the Northern Hemisphere.

Later on, months after the event, things will get worse. The ozonosphere will be gone, or nearly gone, and the planet will then be exposed to the full, lethal energy of ultraviolet radiation as soon as the dust and soot have cleared away. It was only because of the protective action of ozone that complex, multicellular organisms were able to gain a foothold in life a billion years ago, and most of these creatures are still as vulnerable as ever to ultraviolet light.

The Southern Hemisphere will be less affected, assuming that the nuclear exchange is confined to the North, but extensive damage is still inevitable throughout the globe, most of it due to chilling.

Bacterial species are less vulnerable to radioactivity and cold than are the higher organisms, but many species in the soil will be lost in the initial heat of fireballs or in the later firestorms and wildfires covering huge areas.

It is not known how many forms of life would be permanently lost. After a period of years, some of the surviving species might reestablish themselves and set up new ecosystems, but there is no way of predicting which ones, or what sorts of systems, beyond the certainty that everything would be changed.

In such an event, the question of the survival of human beings becomes almost

[1] R.P. Turco *et al.*, "Nuclear Winter: Global Consequences of Multiple Nuclear Explosions," and Paul R. Ehrlich *et al.*, "Long-Term Biological Consequences of Nuclear War," *Science*, Vol. 222, No. 4630, December 23, 1983, pp. 1283–1292, 1293–1300. Although this *Science* paper, and the accompanying paper by Ehrlich *et al.* dealing with the obvious biological consequences of the TTAPS climate prediction, were reviewed and approved by a considerable number of investigators from relevant disciplines, I am aware that there exists a body of scientific opinion in varying degrees of disagreement with the data. This seems to me a matter of such overwhelming importance that I hope the scientific controversy, whatever its nature, will be conducted in the usual open manner and followed attentively by the press.

In connection with these same scientific studies, a leader in the original climatic research, Carl Sagan, has also published an article that both summarizes the results of the studies and explores the possible implications of the new findings for policy and action concerning nuclear weapons. Sagan, "Nuclear War and Climatic Catastrophe: Some Policy Implications," *Foreign Affairs*, Winter 1983/84, pp. 257–292. I believe that extensive debate on these policy implications should proceed openly—as indeed appears to be the case in this magazine and elsewhere.

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a trivial one. To be sure, some might get through, even live on, but under conditions infinitely more hostile to humans than those that existed one or two million years ago when our species first made its appearance.

Civilization, and the memory of culture, would be gone forever. Given the kinds of brains possessed by our species, and the gift of memory, all that might be left to the scattered survivors, staring around, would be the sense of guilt for having done such damage to so lovely a creature, and a poor heritage for a poor beginning.

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COMMENT AND CORRESPONDENCE

NUCLEAR WINTER

To the Editor:

The sober analysis presented in Carl Sagan's article, "Nuclear War and Climatic Catastrophe," in your Winter 1983/84 issue, suggests that a nuclear conflict could have consequences even worse than previously imagined. It remains to be seen, of course, whether there will be broad scientific validation and acceptance of the nuclear winter analysis. Yet if the initial assumptions prove only remotely accurate, the wider strategic implications will be profound. They may significantly affect our understanding of nuclear deterrence and of the stability of the Soviet-American confrontation.

It should be made clear at the outset that these lessons are complex. While the consequences of the nuclear winter analysis may actually work to strengthen deterrence and hence contribute to strategic stability, there are major associated perils as well. In short, although we are likely to witness an important evolution in our understanding of nuclear deterrence, there is no panacea here.

The Sagan analysis provides an important tangible basis for the haunting fear that a major nuclear war could cause the extinction of civilization. There will be, first of all, no sanctuary from the climatic consequences of such a conflict. By itself, geographic distance from the target of a nuclear attack will not provide protection against a nuclear winter. Moreover, once the threshold of nuclear winter has been crossed, a total loss of control is inevitable. As the late Herman Kahn observed, uncontrollable weapons cannot be rationally utilized. Hence, in the future, the use of nuclear devices can be considered "rational" only if their numbers, yield and mode of employment do not exceed the nuclear winter threshold. Self-restraint by both sides becomes a necessary condition for the employment of nuclear weapons by either side. Thus, ironically, it can be argued that a first use of nuclear weapons would require a higher degree of trust in the adversary's will and capacity for restraint than that required, for example, by an arms control agreement.

Perhaps the most immediate implication of the nuclear winter theory is that the possibility of a disarming first strike becomes even more remote than it is now. In the nuclear winter scenario, a first strike may become self-destructive, even in the unlikely event that the attacking side succeeded in denying the adversary its capacity to retaliate. This logic introduces a component of self-deterrence into the balance of terror. Stability would no longer depend solely on the ability of each superpower to sustain an enemy first strike and remain capable of retaliating by inflicting unacceptable damage on the attacker. Beyond a certain level of numbers and yield, self-deterrence could supplement second-strike capability as an obstacle to nuclear aggression.

Second, given that the threshold of nuclear winter is at some absolute rather than relative level, the possibilities of "minimum deterrence" for countries such as France, Britain and China also increase. Provided their arsenals are maintained at or above a certain minimum size, a nuclear conflict to which they are a party would carry the risks of global climatic catastrophe, even if their nuclear forces were greatly inferior to those of the Soviet Union.

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A third implication of the nuclear winter scenario is the likelihood that policies of "first use" of nuclear weapons, which are still a vital part of NATO doctrine in deterring Soviet conventional attack in Europe, would become even less credible. The threat of escalation to a nuclear level in Europe has become increasingly problematic, but it now may lack plausibility altogether if there is any chance of crossing the nuclear winter threshold. Of course, the simple existence of such a threshold does not preclude the employment of low-yield tactical nuclear weapons as a possible answer to an adversary's superiority in conventional forces. However, the "benefits" of such a use of nuclear weapons would have to be weighed against the increased risks involved if further escalation were to result.

Ironically, European concern over the possible erosion of U.S. nuclear security guarantees could to some degree be offset by lessened anxiety over an opposite fear, namely that a large-scale nuclear conflict between the superpowers could be confined to the European continent. Because there can be no sanctuary from the effects of a nuclear winter, any chance that the United States and U.S.S.R. could limit a nuclear exchange to European territory is greatly reduced. Europeans may view Washington as therefore becoming even more cautious about contemplating the use of nuclear weapons than if it were more certain that their effects could be confined to the European theater.

Because it casts increased doubt on the credibility of any U.S. nuclear "umbrella" for Europe, the most important result of the nuclear winter scenario for Alliance politics will be to call attention to the vital role of conventional forces in European defense. The increased significance of conventional forces may be seen to favor the Soviet Union, which has larger forces in being, but that advantage, as a number of recent studies have suggested, is not necessarily usable or decisive. In any event, the issues raised by the nuclear winter debate offer yet another reason for the United States to devote less of its resources to enhanced strategic nuclear programs and to redirect its efforts toward conventional forces in collaboration with its NATO allies.

As mentioned, the effects of Dr. Sagan's findings on the overall strategic balance are likely to be positive, substantially complicating the calculations of a nuclear aggressor. In some senses, they are also likely to work to America's benefit, rewarding Washington's past investment in relatively low-yield warheads of great accuracy. By contrast, the Soviet Union is disadvantaged by its emphasis on high-yield warheads. Because the use of larger warheads moves a country more quickly toward the nuclear winter threshold, this makes much of the Soviet arsenal potentially unusable and thus diminishes its credibility.

Over the longer term, however, the stability of the nuclear balance is by no means secure. If there are no advances in arms control, both the United States and the Soviets would be likely to develop smaller but more accurate strategic nuclear warheads, for use at levels below the threshold of the nuclear winter. There may also be other technological innovations aimed at creating more usable weapons, such as the penetrating sub-surface warheads envisaged by Dr. Sagan. If, therefore, the nuclear winter analysis does not lead to significant new agreements, then in the longer term there may still be a risk of preemption and hence a more precarious balance of terror.

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Professor of Political Science
Hebrew University of Jerusalem

ROBERT J. LIEBER
Professor of Government
Georgetown University

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To the Editor:

In his article, Dr. Sagan bases his arguments on calculations which are functions of the megatonnage of hypothetical nuclear wars. Thus Table 1 and Figure 1, both showing the estimate effects conditioned by megatonnage.

And yet, when Dr. Sagan turns to his strategical arguments that are meant to support the case for arms control, he illustrates the effects of the "arms race" with data based on the number of warheads, and not total megatonnage levels.

One may safely infer that Dr. Sagan did not use megatonnage because, had he done so, his Figure 2 which shows the exponential growth of the "arms race" would not show that at all, but rather a very dramatic decline.

Undoubtedly Dr. Sagan discovered in mid-course that as far as megatonnage is concerned there has been much disarmament (present U.S. megatonnage totals are less than 25 percent of those of 20 years ago). But to show stockpiles declining so drastically would scarcely have set the stage for his sermon; hence the switch to warheads—not at all the proper index in the context.

I am sorry to see such analytical sharp practice in the pages of *Foreign Affairs.*

EDWARD N. LUTTWAK
Senior Fellow
Center for Strategic and
International Studies
Washington, D.C.

To the Editor:

After analyzing the danger of a sharp temperature drop caused by nuclear war, Dr. Sagan makes some curious assertions about the implications of his analysis. He writes, "A threshold exists at which the climatic catastrophe could be triggered, very roughly around 500–2,000 strategic warheads." Yet Case 11 in his analysis, involving 3,000 megatons in 2,250 explosions, would cause a temperature drop of 15°F, less than one-fourth the effect of Case 14, which assumes 100 megatons in 1,000 explosions. The nuclear winter depends not primarily on the number of explosions or the amount of megatons involved, but on what targets are hit. As Dr. Sagan writes, "it is the soot produced by urban fires that is the most sensitive trigger of the climatic catastrophe." An intense counterforce war (attacks on military targets), such as assumed in Case 11, is therefore less disruptive of the climate than is a small countervalue war (attacks on cities), as in Case 14. Dr. Sagan has, in sum, shed new light on the debate about counterforce versus countervalue targeting: previous analyses underestimated significantly the difference in destruction between the two targeting strategies because the nuclear winter effect was not taken into account.

Dr. Sagan also suggests that his work on the nuclear winter effect casts doubt on the usefulness of ballistic missile defense, because "even if 5 to 30 percent of attacking missiles get through in something like a full exchange, the catastrophe could be triggered." Once again, his scientific work does not necessarily support the policy conclusions he draws. Case 17, a severe attack of 10,000 megatons and 16,160 explosions, would involve temperatures dropping 40°F further than in the baseline case, which entails 5,000 megatons in 10,400 explosions. If a ballistic missile defense system could eliminate 36 percent of the warheads (5,760 out of 16,160), the effects of the nuclear winter would be less severe and shorter.

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The difference at the end of three months, for instance, would be between an average Northern Hemisphere temperature (away from coastlines) of roughly -10°F and one of below -40°F. Some might find that difference not inconsequential. In any case, Dr. Sagan's work should put to rest the claim that a ballistic missile defense of cities is of little value unless it stops all the incoming missiles; he has shown that the destruction caused by a few missiles exploding on cities is much less than the devastation brought about by a full-scale attack that causes a nuclear winter.

Finally, I am puzzled by one aspect of Dr. Sagan's scientific work. He writes, "The climatic threshold for smoke in the troposphere is about 100 million metric tons, injected essentially all at once." In the TTAPS article of which Dr. Sagan is a co-author (*Science*, December 23, 1983, pp. 1283–1292), we are informed that the current annual global smoke emission is about 200 million tons. I would assume that in the aftermath of nuclear war, the annual global smoke emission would significantly decrease. Indeed, the smoke emission in the year after a nuclear war might well be near the current level, because the reduction in smoke from current sources could equal the smoke from nuclear-war-related fires, which TTAPS suggests would reach 225 million tons in the event of a 5,000-megaton war. The TTAPS authors attribute the greater impact of wartime smoke compared to ordinary smoke to the higher proportion of graphitic carbon, which they assume to be 30–50 percent by weight in wartime smoke. (The height to which the smoke rises is also an important variable.) Yet the authors also state that the nuclear winter would be triggered even if the graphitic carbon content were as low as "a few percent," while they note that current smoke contains on average something less than ten percent graphitic carbon. Surely a key issue in future research on the nuclear winter question should be the relative impact of wartime smoke and ordinary smoke in disturbing the atmosphere.

PATRICK CLAWSON
Washington, D.C.

To the Editor:

When reading Dr. Sagan's article in *Foreign Affairs*, one should bear in mind that mathematical models and computer simulations of complex realities are, alas, undergoing one of their sporadic resurgences in intellectual fashion. Dr. Sagan's elegant preface succeeds in making the reader expect a stiff dose of hard scientific fact without actually saying that that is what he's going to get.

Dr. Sagan, in a recent reply to an article criticizing the nuclear winter thesis, advanced the endorsement of "over one hundred scientists" as sufficient proof of the TTAPS study's validity. What kind of scientists? Since the first-order ecological effects of the nuclear winter ensue from its primary mechanism—the generation and transport of soot and smoke into the high atmosphere—perhaps he can edify us as to the response of the nation's atmospheric scientists to his thesis.

It must be remembered that, in the lower atmosphere, particles are swiftly brought to earth by rainfall. It is by penetrating the boundary layer—the tropopause, between the upper atmosphere and the air below—that the black clouds of the nuclear winter would be endowed with sufficient stability to cause the postulated global chilling.

The mathematical model employed by Dr. Sagan and his colleagues gives an internally coherent account of how black particles placed in the stratosphere

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could block sunlight. However the soot is placed there not by the model but by the modelers. The stratospheric soot in the TTAPS simulation is not up there as an observed consequence of nuclear explosions but because the authors told a programmer to put it there.

Of the many variables in the model, none is more critical than the quantity of smoke actually transported into the stratosphere. The critical question is, therefore, what fraction of the smoke from post-nuclear fires burning on the ground rises high enough to circle the globe before it comes down. The answer that TTAPS uses in assembling the basic numbers that make up the model is five to 30 percent. The principal author of the TTAPS study, Dr. R.P. Turco, has explained the method of determining this critical variable most lucidly: "It's basically just a guess." A guess with consequences that are not accepted by most, let alone all, of Dr. Sagan's colleagues.

Despite the multitude of large fires constantly at work around the world, smoke is conspicuously absent from the stratosphere. It is once in a blue moon that even a whiff of a Canadian wildfire reaches the Atlantic seaboard via the sub-stratospheric jetstream. Even a firestorm needs some help to reach stratospheric eminence. The TTAPS authors, by omitting from their scenario (along with day and night, the seasons and the ocean) the effect of the prevailing wind on the altitude reached by a smoke plume, however large, have provided that help.

The postulated post-nuclear firestorms of TTAPS occur in a dead calm; otherwise, wind shear would quickly lay them low. Since this is what is ordinarily observed to happen in the real world, many atmospheric scientists, including some of those present at Dr. Sagan's closed conference last spring, estimate that the right number for prompt smoke injections into the stratosphere is not five percent but much closer to zero and are accordingly skeptical of the central thesis of TTAPS.

In essence, Dr. Sagan has used a model in one dimension of the least possible vertical sliver of air. Recent two- and three-dimensional models using the TTAPS data base have diverged from Dr. Sagan's predictions by more than 300 percent. In some cases they predict severe local warming.

Does Dr. Sagan believe that one-dimensional models allow us to do hard science? Or are they but tools? Dr. M. McElroy of the Earth and Planetary Physics Department at Harvard has commented, "This is still an open issue; one-dimensional models are completely inappropriate for the quantitative determination of policy concerning nuclear weapons."

For all that has been written about this matter, the complete TTAPS study has yet to be published. If, in the future, a scientific controversy of similar import comes to the Editor's attention, perhaps he will endeavor to inform us of the outcome after it has been arrived at rather than before. It would be edifying to see in the next issue of this journal a précis of the National Academy of Sciences' forthcoming report on the TTAPS conjecture.

RUSSELL SEITZ
Boston, Mass.

Dr. Sagan replies:

I am happy for the opportunity to respond to the preceding four letters, which touch both on the science and on the policy implications of the post-nuclear war climatic catastrophe we have called Nuclear Winter.

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Mr. Seitz is evidently under the impression that a critical factor in the TTAPS computer simulations is the quantity of smoke (mainly from the burning of cities) that rises into the stratosphere. It is true that in our baseline model (Case 1) we assumed that about five percent of the soot reaches the stratosphere. But we also modeled many other cases with different assumptions. Mr. Seitz believes that the best number for the amount of soot reaching the stratosphere is zero percent. If he will examine the curve for Case 3 in Figure 5 of our report in the December 23 issue of *Science*, he will see that when there are no firestorms whatever, when not a single particle of soot reaches the stratosphere, the climatic consequences are essentially unchanged. This is one of many respects in which the TTAPS models are robust. We have been conservative in our parameter assignments, and reasonable variations in many of these parameters do not seem to imply profound changes in the doleful results.

In any case, it should have been clear both from the Figure and from the accompanying text that if only five percent of the total soot were to reside in the stratosphere the net optical and climatic effects would not be altered significantly. My colleague, Dr. Richard P. Turco, tells me that, in his telephone conversation with Mr. Seitz, he did remark that the adapted fraction of soot injected by firestorms into the stratosphere after a nuclear war is essentially a guess, but, Dr. Turco hoped he had stressed, it was an educated guess.

The critical question on the soot loading is not how much reaches the stratosphere, but rather how much rises to a height of several kilometers or more, away from the region where partial containment of the rising soot column or rainout of the soot particles is more likely. The TTAPS microphysical model gives typical timescales for particle removal from the upper part of the troposphere as several months; the comparable number for the stratosphere is about a year.

Mr. Seitz also claims that "recent two- and three-dimensional models using the TTAPS data base" give values of the temperature decline only one-third as large as the TTAPS analysis. An identical contention has been voiced publicly by Dr. Edward Teller, describing the study made at Lawrence Livermore National Laboratory by Dr. Michael MacCracken. I assume this is what Mr. Seitz refers to here. The Livermore results have been widely distributed in preprint form, and an abstract has been published by the American Geophysical Union. The Livermore model injects soot into a low-resolution three-dimensional global circulation model which then distributes the soot over the globe. This distributed soot is then averaged and a two-dimensional model, which takes some account of patchiness, is used to calculate the climatic perturbation.

We must be careful, however, not to compare the TTAPS results over land (which is where people generally live) with the Livermore results for temperature averaged over land and ocean. (Because of the high heat capacity of water, the ocean temperatures drop very little.) Also, when comparing the TTAPS and Livermore results we must remember that the former results apply to soot uniformly distributed over the Northern Hemisphere while the latter results constrain the soot to a much narrower range of latitude and longitude, because of an assumption of only four target regions worldwide. When proper comparisons are made, the two sets of conclusions are in good agreement, and we consider this agreement to be a significant confirmation of the TTAPS results. But even if the temperature declines *were* only one-third as great, the result would still be a disaster unprecedented in human history. This is another unhappy

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reminder of how robust the Nuclear Winter results seem to be. I wish it were otherwise. The prospect does not cheer me.

Both the content and the tone of Mr. Luttwak's remarks surprise me. First, the nuclear exchange scenarios described in Table 1 and assessed in Figure 1 of my *Foreign Affairs* article (pp. 265–66) are nowhere defined solely in terms of megatonnage. On the contrary, both these and the accompanying text should have made clear to any careful reader that at least five variables were involved: the number of explosions, the yield of each, the total megatonnage, the altitude of detonation and the mode of employment (counterforce or countervalue, or both combined). Indeed, the estimated climatic results shown in Figure 1 (as well as the accompanying text) indicate that in most cases total megatonnage is considerably less significant than the other variables, especially the mode of employment. (This point is fully grasped in the first paragraph of Mr. Clawson's letter.)

As for Figure 2, I stated explicitly in the article (p. 285) that for different purposes there are different measures of the efficacy of nuclear arsenals, and then went on to remark that the most appropriate simple figure of merit for calibrating the effect of Nuclear Winter seemed to be the number of strategic warheads. The reason is that higher-yield weapons will tend to be employed in groundbursts and lower-yield weapons in airbursts, so that a lower-yield airburst can burn the same or even a greater area than a higher-yield groundburst. And it is the amount of burning that is critical for the TTAPS analysis. Nowhere in the article do I assign responsibility for the nuclear arms race, nor do I discuss the relative responsibilities of the United States and the Soviet Union.

Now to Mr. Clawson. Apart from the graphitic component of the smoke, a major difference in climatic effect between the annual average quantity of soot produced (from industries, domestic chimneys, slash-and-burn agriculture, forest fires and the like) and the conflagrations attendant to a nuclear war is that in the latter case all the fires are set almost simultaneously in a restricted range of latitude and longitude. On policy implications, certainly climatic implications of counterforce targeting are different from those of countervalue targeting. But when I talk about a rough threshold for triggering Nuclear Winter, I am thinking of capability, not intention. If we could rely on the sobriety, sanity, technical competence and judgment of all the leaders of all nuclear-capable nations for all time to come, then, independent of the level of world arsenals, we might have some confidence that cities would not be targeted; indeed, in that case, we might even believe that nuclear war itself was an impossibility. But if we hold that serious errors in humans or machines are likely to occur if we wait long enough, then it seems prudent to reduce the global strategic inventories to below some rough climatic threshold.

On ballistic missile defense systems, let us suppose, as Mr. Clawson does, the existence of a BMD with a porosity of 64 percent, so that only 10,000 and not 16,000 attacking warheads are detonated. If less than ten percent of those missiles penetrating the BMD are directed at cities, Nuclear Winter would very likely be triggered. The present French *force de frappe*, said to target Soviet cities exclusively, may itself be adequate to trigger a global Nuclear Winter. A "few missiles exploding on cities" would not likely trigger Nuclear Winter, although even that would represent a tragedy of unparalleled dimensions.

Messrs. Horowitz and Lieber felicitously restate a number of the conclusions of my *Foreign Affairs* article, and raise some interesting new points. In particular,

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I find their analysis of the implications of Nuclear Winter for NATO doctrine and "no first use" provocative. But I would be very concerned if the concept of Nuclear Winter were used to argue for an *increase* in the strategic arsenals of Britain, France, China, or other nations. Even a fraction of the present arsenals of these nations, by threatening the destruction of an adversary's major cities and industrial centers, constitutes a very significant deterrent. Augmenting relatively small national arsenals to near or above some threshold for Nuclear Winter gravely increases the jeopardy of everyone on earth, and provides only a modest increment in further deterrence. In one of the many steps we took to guarantee that the TTAPS analysis was conservative, we assumed that no tactical weapons would be exploded. But there are more than 30,000 tactical nuclear weapons in the world, many of them with yields comparable to or greater than those that destroyed Hiroshima and Nagasaki. Tactical nuclear weapons, especially in forested and densely populated Europe, might well be able to trigger, or at least make a significant contribution to, Nuclear Winter.

I am skeptical that the danger of Nuclear Winter works preferentially to the benefit of the United States for several reasons, including the mix of yields in the Soviet strategic arsenals, and the low threshold for Nuclear Winter. I join Horowitz and Lieber in stressing that new strategic agreements, as well as simple declaratory steps—in short, a general nuclear settlement—is even more urgent, now that the ominous prospect of Nuclear Winter is before us.

I am indebted to Richard L. Garwin and Richard P. Turco for helpful discussions.

DOUBTS ABOUT BUILD-DOWN

To the Editor:

By openly acknowledging the defects of the strategic build-down theory and honestly characterizing it as a modest first step in a larger negotiating process, Alton Frye, writing in your Winter 1983/84 issue, almost won over a convert, but not quite. I have no argument with the basic concept of a build-down. There is no inherent contradiction between force modernization and stabilizing reductions, but there is certainly no direct correlation either. In its current form, build-down, like SALT I, would address a numerical problem without imposing any qualitative constraints. It would produce real reductions in warhead levels. In theory, shrinking arsenals would enhance preexisting desires for more survivable weaponry, but it would also enhance the preexisting drive for damage limitation. The concepts of survivability and damage limitation are both complementary and contradictory. Survivability could be thought of as a passive form of damage limitation. The more survivable the weapons, the less damage a first strike could inflict upon the arsenal. The idea is to ensure retaliatory capabilities. This would enhance deterrence and hence stability.

Damage limitation, on the other hand, is a more active process. In the event of a nuclear war, damage to the homeland could be "limited" by destroying as many of the enemy's weapons as possible before they could be used. It is difficult to argue with such laudable motives, but if this drive was too successful the distinction between damage limitation and preemption could be lost. There is no more destabilizing influence than the threat of preemption.

The survivability of any particular weapon cannot be determined in isolation. It is primarily a function of the weapon's basing mode and of the countermeasures

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taken against it. Every weapon has its countermeasure. A build-down would certainly produce new basing modes, but it would also produce new countermeasures. It is quite conceivable, therefore, that the drive for survivability, predicted by Mr. Frye, would be outstripped by counterforce technologies. This is precisely why we are in our current dilemma. An unrestricted build-down could produce shrinking arsenals of increasingly vulnerable weapons and the world would be in a more precarious situation than it is today.

For instance, the removal of multiple independently targetable reentry vehicles (MIRVs) from intercontinental ballistic missiles (ICBMs) would be stabilizing only if it is assumed that submarine-launched ballistic missiles do not in the meantime acquire the ability to reliably destroy hardened targets. There is legitimate cause for concern that SLBMs will, in the near future, achieve this capacity. They will remain heavily MIRVed and will have a more time-urgent delivery than any of today's most threatening ICBMs.

Doubts about the survivability of retaliatory weapons are usually dealt with by expanding arsenals. The more weapons you have, the more will survive an enemy first strike. In an environment of shrinking arsenals, these doubts could easily trigger the use of unverifiable systems to ensure retaliatory capabilities. If you can't find it, you can't destroy it. The deployment of thousands of cruise missiles, many with dual capability, could present insurmountable verification difficulties.

As inadequate as SALT I was, it at least recognized the inseparability of offensive and defensive systems. The immediate response to the deployment of any large-scale ballistic missile defense system would be the expansion of offensive arsenals to overwhelm these systems and ensure penetration. A build-down treaty could not survive the pressures of a Star Wars defense.

Mr. Frye recognizes the problems of increasing SLBM accuracy, dual-purpose cruise missiles, and laser weapons, but does not deal with them in the build-down context. "One dragon at a time!" he pleads, but like the blind men exploring the elephant, isn't he really describing different aspects of the same dragon? Are these issues really separable? He recognizes the inseparability of strategic and medium-range weapons in Europe. It is evident from the demise of negotiations on limiting intermediate-range nuclear forces (INF) and the indefinite suspension of the strategic arms reduction talks (START) that nothing will be resolved until the strategic implications of French, British, and American intermediate-range weapons are taken into account. Yet Mr. Frye appears to support the U.S. position despite his own eloquent advocacy for the inclusion of INF in the build-down process and the Administration's failure to do so.

I wish I could believe Mr. Frye's reassurances that build-down is a viable first step and that subsequent negotiations would deal effectively with these other pressing problems. The unfortunate perception is not that build-down was designed to bridge the gap between the freeze movement and the advocates of force modernization, but that it was designed to manage opposition to this Administration's policies. The President's adoption of build-down does not add credibility to his arms control image; it damages the credibility of build-down. Mr. Reagan came to power with a history of opposition to arms control. It was his vituperative rhetoric that spawned the freeze movement. It was he who responded to this movement by accusing millions of Americans of being communist dupes. His efforts at INF and START appear reluctant, insincere, and theatrical. The very language he chooses, like the "Zero Option," the "Peacekeeper" and, yes, "Build-Down," comes across as so much gimmicky doubletalk.

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Actions speak louder than words, especially when the words are so obviously abused. A build-down is supposed to result in smaller, more stable arsenals, but the threatening qualities of most of the weapons currently under development directly contradict this stated purpose. The explicit political linkage of the build-down proposal and MX funding smacks strongly of hypocrisy.

How can the American people, much less the Soviet government, accept the sincerity of a proposal with such obvious dangers and such dubious origins? Although I would prefer a freeze and gradual, balanced reductions, I am attracted to the build-down concept. If I could believe that sincere advocates of arms control were involved and that effective qualitative constraints were included, I would praise build-down as a feat of genius. As it stands it is a dangerous exercise in creative public relations.

THOMAS E. STIPE
East Orland, Me.

Mr. Frye replies:

Mr. Stipe's thoughtful letter makes many points with which I agree. Having worked for more than two decades to establish the necessity for qualitative arms control—including several years as staff director for Senator Edward Brooke's effort to head off MIRV testing and deployment—I share his basic perspective on the hazards of unregulated technological competition in strategic weaponry. Those who crafted the build-down initiative and pressed it upon the Administration do not dismiss that concern, but address it from a different angle.

In an environment of expanding force levels, we are already seeing the emergence of the technologies which worry Mr. Stipe. The United States is starting to field thousands of cruise missiles. It is moving forward with significant additions to hard-target kill capability in its ICBM force. It is headed toward sea-based counterforce capabilities in the next decade. Dubious efforts to undercut the Anti-Ballistic Missile (ABM) Treaty are emerging in the "Star Wars" initiatives. With the dynamic of fear and hostility now prevailing on both sides, we are likely to see matching programs by the Soviet Union. In my judgment, quantitative growth of the magnitude now in prospect will doom hopes for qualitative restraint.

Build-down frames the issues sequentially. If we impose the discipline of substantial force reductions, will we improve or diminish the chances for negotiating qualitative restraints to enhance stability at the lower levels to which the two nations will be moving? Will reductions increase or decrease mutual awareness of the need to limit new counterforce technologies? Will it become more or less apparent that the offensive force reductions which both governments profess to want are incompatible with space-based and other strategic defense systems?

Speaking personally, I believe that qualitative arms controls will be more achievable in a shrinking universe of weaponry because they will become even more imperative—and because agreement on force reductions will shape a more favorable diplomatic climate for establishing qualitative restraints. To anticipate the strategic posture toward which one might work under a build-down regime, it would favor single-warhead ICBMs over large MIRVed systems like the MX, limited numbers of air-launched cruise missiles over sea-launched and ground-launched cruise missiles, sea-based ballistic missiles designed to deter but not to disarm the other side, and continued adherence to strict restraints on ballistic

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missile defense. Those are goals, I submit, which Mr. Stipe and those of like mind should endorse.

A couple of technical points: Mr. Stipe asserts that de-MIRVing ICBMs would be stabilizing only if SLBMs do not acquire reliable hard-target capabilities. I believe that is incorrect. Moving to single-warhead ICBMs would enhance stability even if they were targetable from sea, because they would alter the force-exchange ratios by obliging an attacker to expend two warheads to destroy one warhead, rather than two warheads to destroy ten. Smaller ICBMs would also open up mobile options which could bolster stability by making them more difficult to target. Furthermore, while I do not favor sea-based counterforce systems, they are at least preferable to those on land in that they themselves are more survivable and less prone to the "use-them-or-lose-them" syndrome.

Mr. Stipe does not trust President Reagan and his Administration to pursue the build-down or any other meaningful arms control idea. His skepticism is understandable and may be valid. The burden is on Mr. Reagan to demonstrate that his commitment to negotiated restraint is genuine and not merely a cover for the quest for military superiority proclaimed in his 1980 campaign. In allowing the MX missile program to proceed, albeit at a slower pace, the legislative advocates of build-down have given the President the benefit of the doubt, but they will have occasion periodically to reappraise that verdict. For the moment, the Soviets have relieved the President of the burden to perform in the negotiations by their withdrawal from the bargaining table. We will not know whether the President's pledge to pursue an equitable build-down is sincere unless the negotiations resume.

Whether or not the Soviets return to the START negotiations, whether or not Mr. Reagan returns as President, it is vital to keep two things in mind: 1) any agreement to reduce the two sides' strategic forces will require some kind of integrated framework akin to that which has evolved under the build-down rubric, permitting fair trade-offs between the two nations' highly asymmetric forces; and 2) any President who hopes to succeed in ratifying a future strategic arms agreement will need the kind of bipartisan coalition which has come to support the strategic build-down concept.

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RECENT BOOKS ON INTERNATIONAL RELATIONS

Edited by Lucy Edwards Despard

General: Political and Legal

John C. Campbell

THE TIME OF THE ASSASSINS. By Claire Sterling. New York: Holt, Rinehart and Winston, 1984, 264 pp. $14.95.

With the sharpness and doggedness of a legendary supersleuth, Claire Sterling has followed the tracks of Mehmet Ali Agca, the Pope's 1981 assailant, and those with whom he was associated, across several countries from Turkey to Italy, badgering police officials and unearthing facts to put together the story of the crime of the century. Her main purposes are, first, to prove the "Bulgarian connection," and behind it the Soviet connection, and, second, to expose and decry the unwillingness of Western intelligence agencies, particularly the CIA, to find the facts for themselves or to recognize them when found by others. The story she tells is convincing as regards the Bulgarian role; that of the KGB has to be left to logic and inference.

TERRORISM: THE SOVIET CONNECTION. By Ray S. Cline and Yonah Alexander. New York: Crane, Russak (with the Center for Strategic and International Studies, Georgetown University), 1984, 165 pp. $9.75 (paper).

The message of this book, an exposé of a global terror network serving a coordinated, Moscow-directed strategy of destabilizing non-communist states and promoting communist revolutions, is both a cry of alarm and a call to action. The network includes not only the KGB and the world communist parties but also the East European regimes, Cuba, Nicaragua, Vietnam, North Korea, Libya, the PLO, SWAPO, the Red Brigades, the IRA and many others. In bringing to light many facts, some confirmed, some not, the authors back up a number of their allegations, but they also allege more than they prove. The PLO is pictured as a purely terrorist organization, as much concerned with Moscow's world revolution as with Palestine. An appendix, made up of material captured by the Israelis in Lebanon in 1982, proves little more than that the U.S.S.R. consulted frequently with the PLO and provided arms and training.

THE SPELLBINDERS: CHARISMATIC POLITICAL LEADERSHIP. By Ann Ruth Willner. New Haven: Yale University Press, 1984, 212 pp. $17.95.

The author first defines charisma (no easy task), discusses the necessary leadership qualities and the chemistry between leader and followers, then illustrates her theories with examples of seven twentieth-century leaders: Hitler,

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Mussolini, Roosevelt, Gandhi, Sukarno, Castro and Khomeini. Not quite in the same league are Lenin, Mao, Atatürk, Nasser and Perón. For better or worse, societies anchored in democratic institutions do not seem to produce charismatic leaders, F.D.R. being the exception. Much of the book belabors the obvious, but on the whole the author makes her case well and enlarges understanding of the phenomenon of charisma in this age of mass politics.

HUMAN RIGHTS AND THE UNITED NATIONS: A GREAT ADVENTURE. By John P. Humphrey. Dobbs Ferry (N.Y.): Transnational Publishers, 1983, 350 pp. $35.00.

Professor Humphrey, a Canadian, served the U.N. from 1946 to 1966 at the center of all the work in the field of human rights. He gives an insider's story of the negotiations and debates on the Declaration of Human Rights and the conventions on genocide and on civil and political rights. Much of the book appears to have come from the author's diary, with details on hotels and dinners and the like, and personal opinions on various officials and personalities. Not all of it will be as great an adventure to readers as it was to him.

THE DIPLOMATS. By Martin Mayer. New York: Doubleday, 1983, 417 pp. $17.95.

Mayer applies his time-honored technique in this popular presentation of the practitioners of diplomacy, as he has presented bankers, lawyers and others. Roaming all over the field of foreign policy and international relations, and backward into history, he concerns himself mainly with American organizations and personalities, but delves into the diplomacy of others as well, with frequent references to how it is done in Britain, Denmark, the European Community, New Zealand and Israel. He is in general well informed, realistic, skeptical, humorous, and on small points occasionally inaccurate.

General: Military, Technological, and Scientific

Andrew J. Pierre

BALLISTIC MISSILE DEFENSE. Edited by Ashton B. Carter and David N. Schwartz. Washington: Brookings, 1984, 455 pp. $32.95 (paper, $12.95).

This important book provides the most informative and judicious analysis to date of one of the most critical strategic nuclear questions of the next two decades. Can ballistic missile defense be made to work and, if so, is it desirable, given that it could overturn accepted notions of mutual deterrence? There remains no clear answer and the authors provide a range of opinions. On the technical issue: research and development progress has been made since the great ABM debate of a decade ago, and it will continue, but the ABM Treaty would have to be abrogated or revised, and the degree of confidence in ballistic missile defenses is unlikely to allow the superpowers to move away completely from their mutual hostage relationship. Politically, ballistic missile defense would create enormous difficulties for America's allies and in East-West relations. Yet there are counter-arguments, and all points of view are responsibly spelled out in this thorough study. One noteworthy observation is that the implementation of missile defense forces and strategy would be a very long-term process at best.

LASER WEAPONS IN SPACE. Edited by Keith B. Payne. Boulder (Colo.): Westview Press, 1983, 227 pp. $20.00 (paper).

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AMERICAN MILITARY SPACE POLICY. By Colin S. Gray. Cambridge: Abt Books, 1983, 128 pp. $28.00.

President Reagan's call for space-based ballistic missile defense, and the development of anti-satellite weapons, is forcing renewed and urgent attention to the military dimension of space. These two books, by authors who work together, complement each other and *in toto* examine many of the issues which the military use of space raises. In general, they support the Administration's plans for space, but not uncritically, pointing out that military systems in space are vulnerable and that space cannot be considered a safe sanctuary.

THE AFTERMATH: THE HUMAN AND ECOLOGICAL CONSEQUENCES OF NUCLEAR WAR. Edited by Jeannie Peterson for *Ambio*. New York: Pantheon, 1983, 196 pp. $7.95 (paper).

The foreword states that this book is published "in the belief that a realistic assessment of the possible human and ecological consequences of a nuclear war may help to deter such a catastrophe." To what extent this is the case is debatable: conclusions which are too apocalyptic—not necessarily the case here—may erode the will to defend or survive. The scientific data presented is striking but not as impressive in scope or depth as several other recent studies.

ARSENAL: UNDERSTANDING WEAPONS IN THE NUCLEAR AGE. By Kosta Tsipis. New York: Simon and Schuster, 1983, 342 pp. $16.95.

In this book a knowledgeable scientist explains in layman's language the physics and technology of nuclear weapons and their delivery systems. In the process he raises disturbing questions about the vulnerability and often the utility of some major weapons systems. Considerations of cost, efficiency and practicality lead him to doubt the utility of particle beam weapons, for example. Among his peers, Kosta Tsipis's book will be controversial.

DECISIONMAKING FOR ARMS LIMITATION. Edited by Hans Guenter Brauch and Duncan L. Clarke. Cambridge: Ballinger, 1983, 368 pp. $35.00.

What makes this book interesting is its comparative approach. The bureaucratic structures for dealing with arms control are described for countries such as France, Germany, Britain and Norway. One wishes for more discussion of the "politics" and "process" of decisionmaking, and even some of the descriptive material is too brief; nevertheless, the portions dealing with countries other than the United States make this book valuable.

THE POLITICS OF NUCLEAR CONSULTATION IN NATO, 1965–1980. By Paul Buteux. New York: Cambridge University Press, 1983, 292 pp. $39.50.

One of the least known but most effective Western institutions is the Nuclear Planning Group (NPG) of NATO. Conceived in 1965 as a result of the debacle of the multilateral nuclear force, it has been a forum for consultation on the Alliance's strategic policy, especially regarding tactical atomic weapons and the control of nuclear arms. This is a highly readable and well-balanced account of about as much as can be discussed about NPG deliberations. Whether the NPG will perform as well in the changed military and political circumstances of the 1980s is an open question, as the author recognizes.

SOVIET POWER AND WESTERN NEGOTIATING POLICIES. Edited by Uwe Nerlich. Cambridge: Ballinger, 1983. VOL. I: THE SOVIET ASSET: MILITARY POWER IN THE COMPETITION OVER EUROPE. 384 pp.

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$30.00. VOL. II: THE WESTERN PANACEA: CONSTRAINING SOVIET POWER THROUGH NEGOTIATION. 456 pp. $38.00.

Almost all aspects of Soviet military and political strategy toward Western Europe are treated in these two exhaustive volumes by a long list of recognized experts. The connecting tissue appears to be the thesis that the Soviets use their military power primarily to shape political outcomes and that Western strategies for negotiating arms control have taken insufficient account of this. Many of the contributions in these volumes merit close study.

SOVIET THREAT PERCEPTIONS OF NATO'S EUROSTRATEGIC MISSILES. By William V. Garner. Totowa (N.J.): Rowman & Allanheld (for the Atlantic Institute for International Affairs), 1983, 118 pp. $14.00 (paper).

Analyses of Soviet perceptions of Western intermediate nuclear forces, based on actual readings of Soviet literature and press, are far too few. This detailed and scholarly study, therefore, makes a welcome contribution. Garner concludes that the Soviets are indeed concerned by the new NATO deployments, especially the Pershing IIs, but not to the extent suggested by their propaganda campaign in Western Europe.

KAHN ON CODES: SECRETS OF THE NEW CRYPTOLOGY. By David Kahn. New York: Macmillan, 1984, 343 pp. $19.95.

ENIGMA: HOW THE GERMAN MACHINE CIPHER WAS BROKEN, AND HOW IT WAS READ BY THE ALLIES IN WORLD WAR TWO. By Wladyslaw Kozaczuk. Frederick (Md.): University Publications of America, 1984, 348 pp. $24.00.

ALAN TURING: THE ENIGMA. By Andrew Hodges. New York: Simon & Schuster, 1983, 587 pp. $22.50.

Taken together, these three books put in fascinating perspective the contribution of Polish cryptanalysts to the solution of the high-level German Enigma cipher (ULTRA) in World War II. Kahn's collection of his recent writings contains many nuggets; the foremost is his careful account of the German agent who, via the French, provided the Poles with material that greatly (perhaps crucially) assisted their initial breakthrough in 1932. Kozaczuk, drawing on earlier Polish revelations, contains the fullest account of the Polish achievement, how it was handed over to the British in July 1939, how the Poles, French and British worked together in 1939–40—and the magnificent performance of the Poles and French who remained in France after 1940 and kept the secret intact. The book, originally published in Polish in 1979, is supplemented by useful appendices which, among other things, take account of W.G. Welchman's book on Enigma (*The Hut 6 Story*, reviewed in *Foreign Affairs*, Spring 1982).

The Turing biography, by a fellow mathematician, contains a full account of how the British went on to master more complex Enigma variations introduced just before and during the war, and to apply related techniques to other advanced German systems. Credit is judiciously allocated, and on Enigma itself Turing's contribution must clearly be set alongside that of Welchman; to this observer (and later participant) both accounts lead to the conclusion that the original British debt to the Poles was much greater than the official British history of intelligence (F.H. Hinsley *et al.*, 1979) has acknowledged—but also that the Poles and French could never have matched the assembled brains and technical skills of the British. Enigma is only a small part of a well-written life of a legendary

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mathematician and computer pioneer, dogged by the tragedy of being an avowed homosexual in an uncomprehending time.

W.P.B.

General: Economic and Social

William Diebold, Jr.

THE MARSHALL PLAN REVISITED: THE EUROPEAN RECOVERY PROGRAM IN ECONOMIC PERSPECTIVE. By Imanuel Wexler. Westport (Conn.): Greenwood Press, 1983, 327 pp. $35.00.

Making extensive and judicious use of unpublished American records, Professor Wexler of the University of Connecticut has produced the best book we have had on the Marshall Plan. There are no sensational disclosures or drastic reassessments but a substantial addition to our knowledge about most major aspects of the subject. The treatment of divided American opinion concerning European unification and what to do about it is open to question, partly because the author has purposely scanted questions of foreign policy and uses no European sources.

THE BARBARIC COUNTER-REVOLUTION. By W.W. Rostow. Austin: University of Texas Press, 1983, 126 pp. $13.95.

Unemployment, unused capacity, and stagnation are the "barbaric results" of a failure to understand both the sources of satisfactory growth up to the early 1970s and the troubles of the world economy since, according to Professor Rostow. His cure includes, among other things, an incomes policy; investment in raw materials, energy, agriculture, and the infrastructure; government help in the diffusion of new technologies and in making steel, autos and other basic industries competitive. Highly readable, the book combines pamphleteering with analysis and recommendation of a memo to the President. This first-rate work should be taken seriously even by those who do not believe in Kondratieff cycles.

THE AGE OF INTERDEPENDENCE: ECONOMIC POLICY IN A SHRINKING WORLD. By Michael Stewart. Cambridge: MIT Press, 1984, 192 pp. $15.00.

Not only economists should be interested in this well-conceived (and well-written) book which grapples with two basic weaknesses of conventional macroeconomic policy, Keynesian or monetarist. Interdependence limits what national governments can do; short time horizons make it hard to deal with long-term problems such as pollution, energy and the reeducation of the labor force. Things are even worse if the author is correct in his argument that world financial integration creates a bias in favor of national policies that leave resources unused. There is no easy escape. Mr. Stewart, of University College, London, is clear about the difficulties in achieving the combination of increased international cooperation and nicely balanced national policies that he believes provides the best chance.

INDUSTRIAL CRISIS. Edited by Kenneth Dyson and Stephen Wilks. New York: St. Martin's, 1983, 283 pp. $32.50.

The main strength of this book lies in the first two chapters where the editors thoughtfully and systematically lay out basic questions about how democratic governments handle major difficulties affecting firms or sectors of their economies. Separate chapters on Britain, France, Germany, Italy, Sweden and the

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United States vary a good bit in the quality of their analysis but provide good summaries of the industrial policy measures of the respective countries.

INDUSTRIAL RELATIONS IN PLANNED ECONOMIES, MARKET ECONOMIES, AND THE THIRD WORLD. By J. Wilczynski. New York: St. Martin's, 1983, 256 pp. $35.00.

A veteran comparer of various features of different economic systems, Professor Wilczynski of the University of New South Wales interprets "industrial relations" broadly enough to consider wages, inflation and living standards along with collective bargaining, unions, labor participation and the like. The most interesting chapter deals with immigrant labor, east and west.

ACCUMULATION AND DEVELOPMENT. By Celso Furtado. New York: St. Martin's, 1983, 201 pp. $27.50.

The Brazilian economist called his original work an "academic anti-book" when it first appeared in 1978 in France, where he teaches. It is a series of suggestive meditations involving power and reason, history and the future, dependence and interdependence, wealth and creativity—and quite a bit of repetition. One key thought is that the worldwide spread of industrial civilization is not just a continuation of the same process that industrialized the West. Another is that "in our time, the innovative capacity of industrial capitalism has proved itself most fertile on the international plane."

THE PHARMACEUTICAL INDUSTRY AND DEPENDENCE IN THE THIRD WORLD. By Gary Gereffi. Princeton: Princeton University Press, 1983, 291 pp. $25.00 (paper, $9.95).

Can the steroid hormone industry prove a theory in political economy? Through a complex and most interesting inquiry, Professor Gereffi of Duke University makes a persuasive case that Mexico lost the advantages it once had in this field as the result of multiple dependencies—and some errors on the Mexican side. A broader account of the pharmaceutical industry in the Third World is appended and a good bit of space is given to discussion of theories.

MULTINATIONAL ENTERPRISES AND THE OECD INDUSTRIAL RELATIONS GUIDELINES. By Duncan C. Campbell and Richard L. Rowan. Philadelphia: Industrial Research Unit, Wharton School, University of Pennsylvania, 1983, 289 pp. $20.00.

Ambiguity and uncertainty are bound to afflict voluntary guidelines with which compliance is expected, especially in cases where multinational companies are urged to conform to national standards. This detailed study of some years' experience draws on material from a number of sources but focuses on the interpretation of the OECD text and the cases discussed under it. It is a useful study but, in the end, one is left wondering how much difference the code has made.

TRADE POLICY IN THE 1980s. Edited by William R. Cline. Washington: Institute for International Economics, 1983, 796 pp. (Cambridge: MIT Press, distributor, $35.00).

Although the conference from which this book emerged was held in June 1982 with the GATT Ministerial meeting of that autumn in mind, these 22 papers by specialists from several countries (and the discussions of the papers) contain ideas and data that will be relevant for some time to come.

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EMERGING DEVELOPMENT PATTERNS: EUROPEAN CONTRIBUTIONS. Edited by Istvan Dobozi and Peter Mandi (for the European Association of Development Research and Training Institutes—EADI). Budapest: Institute for World Economy of the Hungarian Academy of Sciences, 1983, 548 pp.

These are papers from the third general conference of EADI, held in Budapest in November 1981. The contributions from a number of European countries (including Hungary and Poland) deal with some very broad and basic issues and also some highly specialized ones. They draw on experience—often firsthand—in Europe as well as the Third World.

THE ROLE AND LIMITS OF GOVERNMENT. By Samuel Brittan. Minneapolis: University of Minnesota Press, 1984, 280 pp. $37.50 (paper, $14.95).

These lively essays (many revised from their original versions) range well beyond the concerns of most financial journalists but only occasionally deal specifically with international matters.

The United States

Gaddis Smith

THE REPORT OF THE PRESIDENT'S NATIONAL BIPARTISAN COMMISSION ON CENTRAL AMERICA. Foreword by Henry Kissinger. New York: Macmillan, 1984, 158 pp. $7.95 (paper).

This is a singularly ambitious undertaking by a dozen thoughtful men. Under the guidance of chairman Henry Kissinger, the report attempts to create a bipartisan consensus for what is basically current Administration policy toward Central America—only more so. Its strongest recommendations center on scale: more economic aid, more military aid, bigger programs to confront the fact of a Marxist regime in Nicaragua and the threat of one in El Salvador. "There might be an argument for doing nothing to help the government of El Salvador. There might be an argument for doing a great deal more," contends the report. "There is, however, no logical argument for giving some aid but not enough."

Innovations come in the details. After an exceptionally full and thoughtful discussion of Central America's economic problems, the report's comprehensive and large-scale development proposal calls for the creation of several regional organizations to facilitate much-needed economic integration. It is not above lifting a page from Fidel Castro's programs by advocating the creation of a literacy corps to do what Cuban teachers have long done in developing nations.

But the report never successfully resolves the tension between U.S. security interests in the area and the admitted need for radical change in many Central American societies. It affirms that the United States is not threatened by "indigenous revolution" but that it "must be concerned by the intrusion into Central America of aggressive external powers." As policy is currently conceived, in order to fight that intrusion the United States must depend on precisely those forces that have always stood in the way of significant indigenous revolution, thus eventually forcing the advocates of radical change to rely for support on Cuban or Soviet backing. The debate within the commission came to a head over the question of "conditionality," the legislated linkage between improvements in the Salvadoran government's execrable human rights record and continued or increased U.S. assistance there. The commission as a whole recommended such a link. But Kissinger and two other members averred in a footnote that while the objectives of "conditionality" are laudable, neither the

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Congress nor the executive branch should interpret this "in a manner that leads to a Marxist-Leninist victory in El Salvador." Since the armed forces there are almost entirely dependent on U.S. support for their survival against a burgeoning army of communist-led guerrillas, such a judgment would preclude any effective linkage at all.

In the introduction to their report, the commission members described themselves as "well-informed laymen" who took a six-month "odyssey" into the "terra incognita" of Central America's political, economic and social problems. What they discovered, perhaps inevitably, is that these problems are a Gordian knot for any policymaker. The report pulls at a few loose ends, but fails to unravel it.

Christopher Dickey

CENTRAL AMERICA: ANATOMY OF CONFLICT. Edited by Robert S. Leiken. New York: Pergamon Press, in cooperation with Carnegie Endowment for International Peace, 1984, 351 pp. $19.95.

This is an excellent collection of essays, reflecting a wide range of viewpoint and opinion, which should be read alongside the report of the Kissinger Commission. It includes a number of aspects deliberately skirted by that commission, notably the implications of possible U.S. military intervention. And several authors both stress and explore at length the possibilities of negotiation—on which the formulae proposed by the Kissinger Commission seem to this observer too pat (and rigid) for reality. The essays by Viron Vaky and the two by the editor are particularly outstanding.

W.P.B.

A COVENANT WITH POWER: AMERICA AND WORLD ORDER FROM WILSON TO REAGAN. By Lloyd C. Gardner. New York: Oxford, 1984, 251 pp. $22.95.

An American diplomatic historian comments on the difficulties this nation and its leaders have encountered since the days of Woodrow Wilson in using power to propagate and defend democracy. He then goes on to explain why avowed purposes have seldom been achieved. The chapters on the Truman and Eisenhower years are the best; the material on Carter and Reagan is thin and impressionistic.

AMERICAN DIPLOMACY IN THE TWENTIETH CENTURY. By Robert D. Schulzinger. New York: Oxford, 1984, 448 pp. $22.50 (paper, $12.95).

This is a readable survey for the general student of foreign affairs, dealing primarily with ideas and policies developed in the U.S. rather than with formal diplomacy. The author relates foreign policy to cultural and intellectual developments. There are no heroes in this tale.

THE INFLUENCE OF THE CARNEGIE, FORD, AND ROCKEFELLER FOUNDATIONS ON AMERICAN FOREIGN POLICY: THE IDEOLOGY OF PHILANTHROPY. By Edward H. Berman. Albany: State University of New York Press, 1983, 227 pp. $34.50 (paper, $10.95).

The author, inspired by the ideas of the Italian Marxist Antonio Gramsci, explains the overseas activities since 1945 of the major foundations as designed to advance American cultural hegemony and thereby assist in the fulfillment of the government's foreign policy objectives. He describes and implicitly deplores the foundations' support of Western-style universities in the Third World and the Western-style liberal education they purvey. The research is based in part on foundation archives.

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BEYOND CONTAINMENT: ALTERNATIVE AMERICAN POLICIES TOWARD THE SOVIET UNION. Edited by Aaron Wildavsky. San Francisco: Institute for Contemporary Studies, 1983, 265 pp. $21.95 (paper, $8.95).

Several authors in separate essays identify and advocate variations on the policy of containment: selective, moderate, extended, dynamic, etc. Mr. Wildavsky prefers "maximal" containment which is global in scope and includes measures to bring about "pluralization" within the Soviet Union as a means of "weakening its aggressive intent."

MANAGING MOSCOW: GUNS OR GOODS? By Harry Rositzke. New York: Morrow, 1984, 243 pp. $13.95.

Eclectic reflections by a 30-year veteran of the Soviet operational side of the CIA. The author sees military containment as failing to stem Soviet expansion and urges reduced military emphasis and (all too briefly) a positive use of American economic strength, notably in much expanded foreign aid programs. The book is loosely organized, with many debatable judgments too glibly rendered, but it is good for shaking up stereotypes and prejudices—including those of liberals about a monolithic "CIA mind-set."

W.P.B.

THE UNRAVELING OF AMERICA: A HISTORY OF LIBERALISM IN THE 1960s. By Allen J. Matusow. New York: Harper, 1984, 542 pp. $22.95.

This fine volume in the "New American Nation Series" explores the connections of culture and politics in a traumatic decade. Mr. Matusow deals extensively with the war on poverty, civil rights, the rise of the new left, and black power. He attributes the rout of traditional liberal assumptions and political power at the end of the decade to the Vietnam War, a white backlash, and disillusionment with unrealistic expectations. Another volume in the series (by Kenneth Thompson and Norman Graebner) will concentrate on the Vietnam War.

UNITED STATES ARMY IN VIETNAM. VOL. I: ADVICE AND SUPPORT: THE EARLY YEARS, 1941–1960. By Ronald H. Spector. Washington: Center of Military History, U.S. Army, 1983, 391 pp. $18.00 (paper, $11.00).

This volume, the first in the projected official history of the United States Army in Vietnam, is essential for an understanding of deepening American involvement and illustrative of the truism that there is no dividing line between political and military affairs. It describes the beginnings of aid to the French, the desire of the Americans to train Vietnamese troops (the French said no), the painful review of options (including the possible use of atomic weapons) at the time of Dien Bien Phu, and the search in the late 1950s, after the French had gone, for an effective doctrine of military and political assistance to the Saigon regime. The impressive research draws on Army, State Department, presidential, and private manuscripts and archives.

VIETNAM: A HISTORY. By Stanley Karnow. New York: Viking, 1983, 752 pp. $22.50.

This thick companion to the excellent public television series on the war in Vietnam is the best book to recommend for someone who wants to read one book on the subject, but it also will inform the specialist. Mr. Karnow draws on a belief in the importance of history, his journalistic experience in Southeast Asia dating back to 1959, good interviewing, and assiduous research in published and

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unpublished material. The North Vietnamese material is fresh and particularly interesting.

THE KENNEDY CRISIS: THE PRESS, THE PRESIDENCY, AND FOREIGN POLICY. By Montague Kern, Patricia M. Levering and Ralph P. Levering. Chapel Hill: University of North Carolina Press, 1983, 290 pp. $29.00.

Through four case studies—Laos, Berlin, Cuba and Vietnam—the authors explore the ways in which President Kennedy influenced press coverage and was influenced in turn by the press. They have interviewed dozens of journalists and government officials, investigated archives, and constructed a statistical content analysis of five major daily papers. The book is illuminating both for the historian and the political theorist.

JFK: ORDEAL IN AFRICA. By Richard D. Mahoney. New York: Oxford, 1983, 338 pp. $17.95.

John Kennedy entered the White House with a deserved reputation as a supporter of national independence for colonial peoples in Africa. In office he had to adjust his ideals to turbulent and often bloody reality in the Congo, Ghana, and Angola (the three areas which are the subject of this outstanding book), and to deep disagreements within his own Administration between conservative Europeanists and pro-African, pro-United Nations liberals. He sought to advance American interests in the cold war by keeping the cold war out of Africa—an objective fraught with internal contradictions. Although at times he seemed ready to join the anti-liberal camp, he remained to the end quite true to his ideals. This well-written and well-researched book is based largely on unpublished papers from the Kennedy Administration, including transcripts of telephone conversations, and on extensive interviews.

EISENHOWER: VOL. I: SOLDIER, GENERAL OF THE ARMY, PRESIDENT-ELECT, 1890–1952. By Stephen E. Ambrose. New York: Simon and Schuster, 1983, 637 pp. $22.95.

This is the first volume of what promises to be the best biography of Eisenhower. Mr. Ambrose is both gracious and succinct. He emphasizes Eisenhower's zest for action, his calm in emergencies, his excellent judgment, and his extraordinary political skill. Eisenhower pretended, even to himself, that he was not seeking the presidency. But nothing other than what he did in 1951–52 would have been more effective in securing that end. The author is an experienced military historian and one of the editors of the Eisenhower papers.

DARK HORSE: A BIOGRAPHY OF WENDELL WILLKIE. By Steve Neal. New York: Doubleday, 1984, 371 pp. $17.95.

This well-written and admiring biography will help correct the unwarranted historical neglect of a charismatic figure who generated extraordinary excitement in his lifetime (Willkie died suddenly in 1944 at the age of 52). Mr. Neal describes Willkie's meteoric rise as a utilities executive, the remarkable way his nomination as the Republican presidential candidate was achieved in 1940, the close election of that year, and Willkie's growing internationalism during World War II.

ON DEMOCRACY: TOWARD A TRANSFORMATION OF AMERICAN SOCIETY. By Joshua Cohen and Joel Rogers. New York: Penguin, 1983, 240 pp. $6.95.

The authors of this impressive and tightly reasoned essay argue that inequalities in the distribution of resources, inherent in capitalism, drain democracy of

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real meaning and produce an inhumane foreign policy. In seeking to describe the essentials of a new democratic order free of "the intrusions of private power," they write with more convincing specificity and confidence about reform in the domestic policy arena than in the foreign one.

ACTIVISM REPLACES ISOLATIONISM: U.S. PUBLIC ATTITUDES, 1940–1975. By H. Schuyler Foster. Washington: Foxhall Press, 1983, 420 pp. $14.95.

The author was for many years a member of the Public Opinion Studies Staff of the State Department, with responsibility for analyzing American opinion on international issues. The book summarizes internal State Department "American Opinion Reports" and the results of public opinion polls. The material is descriptive, not analytical. Mr. Foster believes that the public will become better informed on foreign affairs "if this is made a deliberate objective."

A DIFFERENT KIND OF PRESIDENCY: A PROPOSAL FOR BREAKING THE POLITICAL DEADLOCK. By Theodore C. Sorensen. New York: Harper, 1984, 134 pp. $11.95.

Mr. Sorensen shares the widespread view that the federal government in its present form is unable to solve the domestic or international problems facing the United States. His solution is a four-year suspension of party politics and a coalition government along the lines of the British wartime government under Winston Churchill. Woodrow Wilson, 65 years ago, dreamed of overcoming partisan opposition to American membership in the League of Nations by importing the British parliamentary system. It seems likely that Mr. Sorensen's proposal, admirable in its purpose, will share the fate of Wilson's dream.

THE JOURNALS OF DAVID E. LILIENTHAL. VOL. VII: UNFINISHED BUSINESS, 1968–1981. Edited by Helen M. Lilienthal. New York: Harper, 1983, 807 pp. $38.50.

David Lilienthal, born in 1899, wrote the final entry in his journal on January 2, 1981—eleven days before he died. This volume completes one of the most valuable personal historical documents of an American public man in the twentieth century. Lilienthal was a progressive lawyer, head of the Tennessee Valley Authority, first head of the Atomic Energy Commission, and after 1950 a creative consultant on development projects in the Third World. He was also a graceful writer. This volume reflects his concern over the world energy shortage and his sadness over the turmoil in Iran, a country in which he had been active.

The Western Hemisphere

Robert D. Crassweller

ON DUTY: A CANADIAN AT THE MAKING OF THE UNITED NATIONS, 1945–1946. By Escott Reid. Kent (Ohio): Kent State University Press, 1983, 181 pp. $15.00.

Escott Reid, then a young Canadian diplomat soon to become prominent, was an active participant at the San Francisco conference on the United Nations and at the first meetings of the new organization. These detailed letters to his wife are important for what they tell us about the early U.N., Canadian policy, and the man himself. G.S.

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THE BANANA WARS: AN INNER HISTORY OF AMERICAN EMPIRE, 1900–1934. By Lester D. Langley. Lexington: University Press of Kentucky, 1983, 264 pp. $26.00.

Recounting the history of the American "empire" in the Caribbean Basin, the author stresses that the United States failed not so much because of the use of force (the whole undertaking was rather reluctant at best), but because of cultural and psychological realities: "Striving to teach by example, they found it necessary to denigrate the cultural values of those whom they had come to save." Their presence thus stripped Caribbean peoples of their dignity and "constituted an unspoken American judgment of Caribbean inferiority. . . ."

THE CARIBBEAN CHALLENGE: U.S. POLICY IN A VOLATILE REGION. Edited by Michael Erisman. Boulder (Colo.): Westview Press, 1984, 208 pp. $22.50.

U.S. policy alternatives and problems are analyzed here in nine essays, including an introduction that defines the contemporary challenge to U.S. policy and a conclusion that outlines four possible policy frameworks. Four chapters are devoted to case studies of Cuba, El Salvador, Mexico and Jamaica. A useful volume.

THE NICARAGUA READER: DOCUMENTS OF A REVOLUTION UNDER FIRE. Edited by Peter Rosset and John Vandermeer. New York: Grove Press, 1984, 359 pp. $22.50 (paper, $8.95).

This is a large collection of source materials, including documents, official statements, speeches and articles concerning the nature of the Nicaraguan revolution and U.S. intervention policies. All views are represented but the balance is clearly in favor of the Nicaraguan experiment.

TROUBLE IN OUR BACKYARD: CENTRAL AMERICA AND THE UNITED STATES IN THE EIGHTIES. Edited by Martin Siskin. New York: Pantheon, 1984, 264 pp. $9.95 (paper).

The turmoil in Central America is sketched here in essays covering the region generally, U.S. reactions, and individual studies of developments in El Salvador, Nicaragua, Guatemala and Honduras. There is an epilogue by Gunter Grass comparing the Sandinistas and the Solidarity movement in Poland in strongly anti-U.S. terms, a viewpoint that is echoed elsewhere in the book.

LATIN AMERICA IN THE WORLD ECONOMY. Edited by Diana Tussie. New York: St. Martin's, 1983, 238 pp. $25.00.

Eight essays, including an introduction by the editor that serves as a synthesis, probe the integration of Latin America into the capitalist world economy and analyze the dependency relationships between center and periphery. Some hope for the emergence of Latin American economic autonomy is tentatively expressed.

Western Europe

Fritz Stern

GERMANY DEBATES DEFENSE: THE NATO ALLIANCE AT THE CROSSROADS. Edited by Rudolf Steinke and Michel Vale. Armonk (N.Y.): Sharpe, 1983, 215 pp. $22.50.

German anxieties and hopes are exemplified by this collection of essays, written by experts and political commentators. The nature of the Soviet threat

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is discussed and a professional soldier, now retired, writes: "The potential of the Soviet Union and its allies to wage war is clearly inferior to the West's." The book sums up much of the moderate and not so moderate criticism of existing NATO strategy and in many instances argues for alternatives, such as a nuclear-free zone, and explicitly or implicitly for greater movement on the German question itself. Useful reading for the complacent—those who think that the status quo can last forever.

EAST-WEST RELATIONS IN EUROPE: OBSERVATIONS AND ADVICE FROM THE SIDELINES, 1971–1982. By Paul E. Zinner. Boulder (Colo.): Westview Press, 1984, 164 pp. $16.00 (paper).

A collection of essays by a political scientist and expert on Eastern Europe, dealing with major European issues after 1977 in an East-West perspective. Informative and judicious pieces, including, *inter alia*, essays on arms control and the peace movement, the Polish crisis and détente. Running through the entire book is the concern with the worsening state of our Alliance (and theirs, too). Zinner writes analytically, but with a good grasp of the practical. He has a particular interest in the German problem and Ostpolitik, the advent of which he thought was "inevitable and its continuation unavoidable. [But] I am not certain if the benefits that may accrue to the Federal Republic will outweigh the liabilities it stands to incur from the Ostpolitik in the long term."

DIE ÄRA NIXON-KISSINGER, 1969–1974. By Christian Hacke. Stuttgart: Klett-Cotta, 1983, 319 pp.

Many Europeans cling to a more admiring view of Richard Nixon and especially of his foreign policy than most American observers manage to do. The Europeans are helped in this by their presumption that Nixon and Kissinger were Realpolitiker of the European school and partly by their neglecting the darker sides of American foreign policy at this time and often entirely ignoring the relationship between Nixon's foreign and domestic styles. This book, by a German political scientist, is a major scholarly effort, born of this view but cogently argued. The book concentrates on the "de-ideologizing" of U.S. relations with China and with the U.S.S.R. and praises the Nixon-Kissinger "classical balance-of-power game," as against Carter's futile moralism and Reagan's fruitless militancy. The book has instructive and relevant *aperçus*, such as the assertion that German Ostpolitik marked the beginning of an erosion of the U.S. leadership of the Alliance. It is a pity that so valuable a study pays so little attention to the domestic aspects of Nixon's foreign policy, to his self-defeating style at home, and to the character of American political life generally.

THROUGH THE LOOKING GLASS: BRITISH FOREIGN POLICY IN AN AGE OF ILLUSION. By Anthony Verrier. New York: Norton, 1983, 385 pp. $18.50.

A fascinating book by a British journalist and writer who argues that some time after 1942 British leaders decided to make up for British loss of real power by relying more and more on the secret intelligence service, a kind of "shadow government" in a different sense. A highly readable and even plausible book, focusing on the Suez debacle, the Cuban triumph, and the Falklands risk. Intelligent and anecdotal variations on the familiar theme of Britain's losing battle with decline.

SOCIALISM IN FRANCE: FROM JUARES TO MITTERRAND. Edited by Stuart Williams. New York: St. Martin's, 1983, 180 pp. $22.50.

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A series of wildly different articles—in subject and quality—ranging from historical reflections on the French left to a study of Paul Nizan, from an analysis of communist rhetoric to a perfunctory statement of present-day official aims of the Mitterrand government.

THE BUTCHER OF LYON: THE STORY OF INFAMOUS NAZI KLAUS BARBIE. By Brendan Murphy. New York: Empire Books, 1983, 336 pp. $13.95.

A Paris-based American journalist reconstructs the career of the Gestapo chief of Lyons, accountable for the murder of Resistance leader Jean Moulin and thousands of others. Murphy draws on interviews in France, Germany, the United States and Bolivia. He relies heavily on the candid statement in 1983 by Allan A. Ryan, Jr. for the Justice Department, in which Ryan disclosed how U.S. counterintelligence used Barbie after the war, constructed a cover-up to protect him from French extradition demands and sent him to South America, where he pursued another successful career in Bolivia. The American role in this appalling type of operation should be further examined.

LEFT OF CENTER: EUROPEAN LABOR SINCE WORLD WAR II. By Adolf Sturmthal. Champaign: University of Illinois Press, 1983, 302 pp. $21.95.

In many ways this is a sequel to the author's well-known *Tragedy of European Labor, 1918–1939*. The second postwar period did not quite mark the triumph of labor, but it did produce an indisputable improvement in the material and moral conditions of what traditionally has been called labor. But Sturmthal warns that neither improvement nor "the end of ideology" has meant "the end of social conflict." Today's struggle has become "a pragmatic strife in which the issues are less exciting for the historian of ideas, but no less consequential in terms of human lives. . . ." The book fastens on the achievements of labor and the effects of the new technology, but slights the existence of social groups which are not, as in the Marxist scheme, exploited, but are simply ignored, pushed into pockets of oblivion, neglect and moral exclusion.

The Soviet Union and Eastern Europe

John C. Campbell

SOVIET FOREIGN POLICY: THE BREZHNEV YEARS. By Robin Edmonds. New York: Oxford, 1983, 285 pp. $9.95 (paper).

The first half of the book reproduces, with some revisions, a study published a decade ago; the second half is new, covering the last ten years of the Brezhnev era. Edmonds, a former British diplomat, writes from a long and deep acquaintance with his subject, although his study has the gaps and limitations which plague all Western attempts to penetrate the mysteries of Soviet motivation and strategy. He does not hesitate to give informed comment of his own, both on Soviet and on Western policy, which he would like to see get back on the track of détente.

THE SOVIET UNION AFTER BREZHNEV. Edited by Martin McCauley. New York: Holmes & Meier, 1984, 160 pp. $17.50 (paper, $9.75).

Ten lectures given in 1982 at London's School of Slavonic Studies and intended for "a wide range of readers" as well as students. Combining textbook exposition on Soviet politics with comments on present and future dilemmas, they tend toward the superficial, although the list of authors (which includes

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Alec Nove, Jonathan Alford, George Schöpflin and Hugh Seton-Watson) bespeaks both intellectual quality and expert knowledge of the U.S.S.R.

SOVIET STRATEGY TOWARD WESTERN EUROPE. Edited by Edwina Moreton and Gerald Segal. Winchester (Mass.): Allen & Unwin, 1984, 296 pp. $28.50.

Because it is written mainly by Europeans and from a European perspective, this book adds a significant dimension to standard American works on the subject by Thomas W. Wolfe, Richard Pipes and others. Not only does it point up where Western Europe's interests diverge from America's (for, though not a study of Western policy, it can hardly avoid that subject), but also, in most if not all of the chapters, it portrays Soviet strategy as the complex product of dilemmas, predicaments and priorities, rather than as the expression of fixed aims and a unilinear guide to policy decisions.

DER WESTEN UND DIE SOWJETUNION. Edited by Gottfried Niedhart. Paderborn (Germany): Ferdinand Schöningh, 1983, 372 pp. DM. 48.

Stressing changing perceptions of the Soviet Union and how they affected the policies of the major Western powers—Britain, France, Germany, and the U.S.—Niedhart and his collaborators have written a solid, informative work on 60 years of history. The chapters covering the interwar period, well documented with unpublished archival material as well as many other sources, are especially good. The perceptions analyzed are mainly those of the policymakers rather than those of the less informed but not necessarily less wise general public.

INTERNATIONAL POLICY FORMATION IN THE U.S.S.R.: FACTIONAL DEBATES DURING THE ZHDANOVSHCHINA. By Gavriel Ra'anan. Hamden (Conn.): Archon Books, 1983, 237 pp. $29.50.

The Zhdanov-Malenkov rivalry in the late 1940s, the Varga controversy and the "Leningrad case" are revisited by an American Sovietologist pursuing every possible "footprint" in the published material. The burden of the argument is that these essentially domestic struggles had a major impact on Soviet foreign policy and are directly related to the break with Yugoslavia (Zhdanov and Tito being close allies). The case is overstated and overargued, but it is worth a close reading.

THE PARTY AND THE ARMY IN THE SOVIET UNION. By Yosef Avidar. Jerusalem: Magnes Press, Hebrew University, 1983, 340 pp. (Atlantic Highlands, N.J.: Humanities Press, distributor).

Avidar, a prominent Israeli general, served as ambassador in Moscow in the 1950s. Here he combines his knowledge of the Soviet Union and of military affairs to trace party-military relations in the Khrushchev period, with particular attention to the role of Marshal Zhukov. Although this is not exactly virgin territory for scholars, Avidar's study is a fine example of the uses of Sovietology to throw light into dark places, and he finds a valuable supplementary source in interviews with former Soviet officers who have emigrated to Israel.

RECOLLECTIONS OF A PIONEERING SOVIETOLOGIST. By John N. Hazard. New York: Oceana, 1984, 139 pp. $20.00.

In an engaging memoir, John Hazard, who is an authority on Soviet law and much more than a "Sovietologist," gives a brief account of a career which spans the half-century of U.S.-Soviet diplomatic relations. The book gently reminds us of his achievements and his signal contributions to the development of Russian studies in America.

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MANAGING CHANGE IN THE U.S.S.R.: THE POLITICO-LEGAL ROLE OF THE SOVIET JURIST. By John N. Hazard. New York: Cambridge University Press, 1983, 180 pp. $29.50.

In a series of lectures given in 1982 Hazard examines the salient problems of change and reform facing Soviet society and the Soviet regime. This is not a legal treatise but a broad treatment of the subject, in which the increasing role of law and lawyers is given its due.

DER ANTEIL DER PRIVATEN LANDWIRTSCHAFT AN DER AGRARPRODUKTION IN DEN RGW-LÄNDERN. By Eberhard Schinke with Zdenek Hunacek. Berlin: Duncker & Humblot (for Giessen University), 1983, 87 pp. DM. 24.

Beset by agricultural crisis and with the example of Hungary's successful experience before them, the U.S.S.R. and other East European countries are looking with a kinder eye on the potential of the private plots. Since it is difficult to collect complete and reliable comparative statistics in this field, this brief monograph put out under the auspices of the University of Giessen is welcome for the generally accurate and up-to-date picture it presents of the place of the private sector in these collectivized agricultural economies.

THE POST-BREZHNEV ERA: AN INSIDER'S VIEW. By Silviu Brucan. New York: Praeger, 1983, 126 pp. $21.95.

Silviu Brucan, a former Romanian ambassador now teaching at the University of Bucharest, is an insider in the sense that he lives in Eastern Europe under a Stalinist-type regime, but he has long been a maverick in his views on world politics and a critic of both East and West from a Marxist standpoint. Here he advocates basic structural changes, economic and political, in the U.S.S.R. and Eastern Europe, pointing to Hungary and Bulgaria as worthy pioneers and holding out hope that a new generation of leadership in the U.S.S.R. will follow. This book would not be publishable in the Soviet Union, nor, one suspects, in Romania.

FOREIGN AND DOMESTIC POLICY IN EASTERN EUROPE IN THE 1980s. Edited by Michael J. Sodaro and Sharon L. Wolchik. New York: St. Martin's, 1983, 265 pp. $25.00.

Contributions to this volume are grouped around three themes: the interaction of domestic and foreign policies, the place of the new specialist elites in East European society and politics, and new factors in Eastern Europe's place in the wider world. Most of the papers are confined to one country and limited by the particular research interests and methods of the individual authors, but three brief general chapters provide some breadth. The book as a whole is noteworthy as illustrating both the fact of continuing change in Eastern Europe and the ability of Western scholars to monitor and analyze it.

DICTATORSHIP OVER NEEDS. By Ferenc Feher, Agnes Heller and György Markus. New York: St. Martin's, 1983, 312 pp. $27.50.

A philosophical-political critique of the Soviet-type systems in Eastern Europe, which the authors, Hungarian scholars now in emigration, see as based on domination and exploitation, a Russian corruption of socialism. Much of the description runs parallel to that of Western observers, but the analysis, Marxist but not Leninist, is different and offers new paths to the understanding of East European reality.

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WARSAW DIARY: 1978–1981. By Kazimierz Brandys. New York: Random House, 1984, 260 pp. $17.95.

The appeal of this book lies less in the external events it describes than in the atmosphere it conveys and the philosophical comments of the author, a distinguished Polish novelist and one-time communist. In West Germany at the beginning of the Solidarity strike, Brandys is disheartened by what he sees as the caviling reaction of West Europeans to the developing drama in Poland, their fear of the Soviet Union obliterating any gesture of respect for Polish courage. He has much to offer both in human interest and in insight into issues of the mind and spirit facing modern man in Poland and elsewhere. These are selected passages from the two-volume Polish edition. Brandys now lives in the West.

The Middle East

John C. Campbell

LEBANON: THE FRACTURED COUNTRY. By David Gilmour. New York: St. Martin's, 1983, 209 pp. $19.95.

The politics of Lebanon has been described before, but David Gilmour's book deserves three stars for keen observation, frankness, and crisp writing. He places the civil strife and foreign intervention that have marked the years since 1975 in the context of centuries of history and of the traditional game of power politics played by the leaders of Lebanon's warring sects and factions. But he is not blankly neutral. He is merciless in his portrait of the Maronites, relatively sympathetic to Muslims, Druse, and to Syria, and in his last chapter his indignation at Israel and the consequences of the Israeli invasion overflows.

GOD CRIED. By Tony Clifton and Catherine Leroy. New York: Quartet Books, 1983, 143 pp. $29.95.

A fierce and emotion-laden controversy, pro- and anti-Israel, followed the publication of this angry and emotion-laden book in England. It is an indictment of Israel's invasion of Lebanon in which the narrative of British journalist Clifton is accompanied by extraordinary and often horrifying pictures taken by his colleague, French photographer Catherine Leroy.

OPERATION PEACE FOR GALILEE: THE ISRAELI-PLO WAR IN LEBANON. By Richard A. Gabriel. New York: Hill and Wang, 1984, 237 pp. $16.95.

An American military analyst's day-by-day narrative of Israel's campaign in Lebanon in 1982, with an introductory sketch of the history and organization of the Israel Defense Forces. In writing this account, based on official reports, articles in military journals, conversations with Israeli participants and a visit to the area, the author strives for balance and objectivity, but the approach is wholly from the Israeli side, evident both in the description of the campaign and in the comments on Palestinians and the PLO.

IN THE LAND OF ISRAEL. By Amos Oz. San Diego: Harcourt Brace Jovanovich, 1983, 272 pp. $12.95.

Voices of Israel—from towns and villages, from settlements in the West Bank, from Jerusalem, from Arabs as well as Jews—constituting the record of many individuals' conversations with a prominent Israeli novelist in the autumn of 1982. These views, conveyed to the reader with Oz's literary talent, can give a sharper picture of public opinion under the impact of the Lebanese war and

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conflict elsewhere than any "scientific" survey, and on the whole it is not a reassuring picture for either domestic or international tranquillity. The central question for Israelis, the meaning of Zionism and of Jewish destiny, is answered in very different ways.

ISRAEL IN THE MIND OF AMERICA. By Peter Grose. New York: Knopf, 1983, 361 pp. $17.95.

With unflagging research and a lively style, Peter Grose, an American scholar with a background in government and journalism, has traced American interest in the return of the Jews to Zion from its scattered appearances among a few individuals in the early 19th century to the official U.S. government recognition of Israel in 1948. The minds of most Americans, as Grose observes, were relatively indifferent to Zionism and the Palestine issue. The real struggle was for the minds of successive presidents of the United States, between an activist segment of the American Jewish community and those U.S. officials who saw the problem in terms of geopolitics and U.S. interests in the Arab world. He is not a one-sided partisan; he exposes the faults and foibles of all concerned (above all, the State Department). What slant the book has derives from his chosen theme: that America and the Jewish state are "bonded together" through history and shared values.

TAKING SIDES: AMERICA'S SECRET RELATIONS WITH A MILITANT ISRAEL. By Stephen Green. New York: Morrow, 1984, 370 pp. $14.95.

This controversial indictment concentrates on the years 1948–1967. The author has burrowed with a prosecutor's diligence into unpublished American archives. The book has been and will be praised by those who believe the United States has damaged its own security, and Israel's too, by uncritical and often secret support of Israel's actions, no matter how extreme. Those who believe that American support has not gone far enough and that American and Israeli interests are identical will sputter with indignation.

BEN-GURION: PROPHET OF FIRE. By Dan Kurzman. New York: Simon and Schuster, 1983, 544 pp. $19.95.

Probably no one will ever write the definitive biography of the titanic, complex character that was Ben-Gurion, but Dan Kurzman, an American journalist-historian, has surely come close to it. He has done an extensive job of research, going through letters, diaries and other writings, and interviewing hundreds of people who knew Ben-Gurion. The treatment is frankly admiring, and with reason; but alongside the courage and vision of Ben-Gurion, Kurzman also cites and illustrates his inconsistency, vindictiveness, intolerance and other less admirable qualities. He writes with dramatic flair, perhaps with some license, as he reconstructs conversations and goes into the details of his subject's private life as well as public career. His achievement is that he brings a great man to life.

THE POLITICS OF MIDDLE EASTERN OIL. By J.E. Peterson. Washington: Middle East Institute, 1983, 529 pp. $30.00 (paper, $14.95).

For purposes of reference or teaching, or for getting a rounded view of a big set of problems, this collection of readings has much to recommend it. One can take exception to the balance of the coverage—Soviet policy gets but one short article, as does the relevance of the Arab-Israeli question to oil politics—or to the selection of authors, but there are enough of the latter (35) to cover a wide spectrum of views.

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Asia and the Pacific

Donald S. Zagoria

CHINA AT THE CENTER: 300 YEARS OF FOREIGN POLICY. By Mark Mancall. New York: Free Press, 1984, 540 pp. $29.95.

One of the West's leading Sinologists takes us through the past three centuries of Chinese foreign policy within the context of traditional Chinese attitudes and beliefs—a broad sweep which offers a rare panoramic view missing in more specialized and contemporary studies. The first section deals with what the author sees as the coherent worldview of the Chinese Empire up until the Western onslaught in the nineteenth century. The second section covers the period 1900–1949, and a briefer section sketches the developments since 1949. In the final section, Mancall argues that the whole essence of China's external relations rests on a fundamental dichotomy between "us" and "them": in the traditional period this was conceived of as civilization versus barbarism; in the contemporary world, "them" is sometimes the Americans and sometimes the Soviets. Mancall also points out that because the Chinese see history as a process they are more patient than Americans, who see foreign policy in terms of present national interest.

CHINA'S FOREIGN RELATIONS. Edited by Chün-tu Hsüeh. New York: Praeger, 1982, 148 pp.

This is an able collection of articles on recent developments in Chinese foreign policy. The editor characterizes China's present posture as follows: the Soviet Union is still the most dangerous threat to China; China is turning toward the West but it intends to maintain an independent policy; China is downplaying ideology and world revolution and emphasizing security and national interest; China is increasingly and constructively participating in the international system.

CHINA AS A MARITIME POWER. By David G. Muller, Jr. Boulder (Colo.): Westview Press, 1984, 277 pp. $30.00.

This is one of the most informative books yet published on the Chinese navy. The author is a career U.S. naval officer with degrees in Chinese studies. Drawing on a large volume of recently declassified U.S. intelligence reports, he concludes that by 1983 the Chinese navy, though not as capable as the Soviet Pacific Fleet or the U.S. Seventh, "has to be counted as formidable, at least within the East and northern South China seas." There are also valuable sections dealing with the role of the navy in the Sino-Soviet split and in internal Chinese factional struggles. Finally, there is a provocative section on the modernization of Chinese naval strategy in which it is made clear that the Soviet naval threat is the primary motivation for developing the Chinese navy.

INTERNATIONAL SECURITY IN THE SOUTHEAST ASIAN AND SOUTHWEST PACIFIC REGION. Edited by T.B. Millar. New York: University of Queensland Press, 1984, 317 pp. $24.95.

This is an unusually solid collection of papers derived from a conference held by the Strategic and Defence Studies Centre at the Australian National University in July 1982. Among several provocative essays, two stand out. Professor Wang Gungwu, a prominent historian, argues that the new commitment to reduce population growth will engage China's energies for a long time to come, require a stable political system with extraordinary powers of social control, and rapid industrialization to ensure a steady and measurable rise in living standards. For

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this reason he projects an extended period of internal stability and external peace in China.

Equally interesting is Desmond Ball's extremely detailed essay on "The Management of the Superpower Balance." He argues in effect that the Reagan Administration oversold the notion of the "window of vulnerability" and that whatever the size of the "window" it will be no more than "a peep-hole" compared with "the yawning gap" that the Soviet Union will face in its own strategic posture by the end of the 1980s. "[T]he MX force will render vulnerable the whole Soviet ICBM force, the mainstay of [their] posture . . . . Survivability of the Soviet SLBM force will be problematical against projected American ASW capabilities . . . . The thousands of ALCM's and SLCM's programmed for deployment will reduce the Soviet air defense investment to impotence . . . ." Obviously this situation will be highly destabilizing and the author concludes ominously that the discrepancies in the strategic balance together with the lack of meaningful dialogue must increase the risk of conflict.

THE SOVIET UNION IN EAST ASIA. Edited by Gerald Segal. London: Heinemann/Boulder (Colo.): Westview Press (for the Royal Institute of International Affairs), 1983, 150 pp.

A short but very valuable collection of essays emanating from a study group at the Royal Institute of International Affairs. Malcolm Mackintosh, one of the West's most astute observers, contends that the Soviets see themselves as "odd man out" among the four major powers in East Asia and that they cannot foresee an improvement in the balance of power in Asia which would be favorable to them. Lawrence Freedman, reviewing the military dimension, argues that the Soviets will find it difficult to make substantial reductions in military capabilities in Siberia in order to improve relations with China. Other essays on Soviet economic relations in the region, and on Soviet policy toward the major powers, are of uniformly high quality.

RED FLAG OVER AFGHANISTAN. By Thomas T. Hammond. Boulder (Colo.): Westview Press, 1984, 261 pp. $26.50 (paper, $11.95).

The author, a specialist on Soviet foreign policy and on communist coups, pours cold water on the idea (apparently held by important officials in the U.N. and the State Department) that Moscow will pull out of Afghanistan in exchange for some kind of neutralization formula. Soviet withdrawal from Afghanistan would involve a loss in Soviet prestige, might lead to trouble in Soviet Central Asia, and would sacrifice strategic advantages gained from moving closer to the Persian Gulf and Indian Ocean. Despite vague promises to withdraw, the Soviets "give every indication that they plan to stay a long time." The author concludes by decrying the American public's lack of interest in the Afghan liberation struggle and by calling for a stronger U.S. position in the Gulf.

Africa

Jennifer Seymour Whitaker

SOUTH AFRICA AT WAR. By Richard Leonard. Westport (Conn.): Lawrence Hill, 1983, 274 pp. $19.95 (paper, $12.50).

This excellent overview of contemporary South Africa should be most useful for students and the general reader looking for a lucid summary of facts and issues. Leonard's essays on apartheid, black politics, Namibia, security forces, the

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arms embargo, South Africa's regional strategy and U.S. policy are crammed with facts and balanced argumentation; although advocating increased pressure on South Africa, he gives the policy of constructive engagement a full hearing, often in the words of its author, Chester Crocker.

THE WEST AND SOUTH AFRICA. By James Barber, Jesmond Blumenfeld and Christopher R. Hill. London and Boston: Routledge & Kegan Paul (for the Royal Institute of International Affairs), 1983, 106 pp. $10.00. Chatham House Papers, No. 14.

Three British scholars discuss Western, and particularly British, stakes in South Africa and lay out a policy for the longer term. Balancing the need for more decisive action against the difficulties of mounting effective sanctions, they call on the West to build up stockpiles of strategic minerals in order to increase Western freedom of action vis-à-vis South Africa, and to apply "positive pressures" for change as in enforcement of investment codes and aid to black labor unions.

SOUTH AFRICA: LOST OPPORTUNITIES. By Frank J. Parker. Lexington (Mass.): Lexington Books, 1983, 290 pp. $27.95.

This description of South African politics, economic ups and downs, governing system, industry, and relations with the United States includes little new in the way of interpretation, but presents a compendium of factual information on the 1977–1982 period.

THE EMERGENCE OF AFRICAN CAPITALISM. By John Iliffe. Minneapolis: University of Minnesota Press, 1984, 113 pp. $29.50 (paper, $10.95).

In this intriguing essay, a Ugandan historian examines the traces of capitalism in Africa, scanty even with his broad definition of the term, from the earliest manifestations to the present. While acknowledging the social obstacles to capitalism (and to productive private enterprise in general), he feels that the major problem lies in Africa's belated start on a now very advanced industrialization process and argues that trained manpower and a national commitment to industrialization will have to precede any African takeoff.

MOZAMBIQUE: FROM COLONIALISM TO REVOLUTION, 1900–1982. By Allen Isaacman and Barbara Isaacman. Boulder (Colo.): Westview Press, 1983, 235 pp. $23.50.

Two longtime observers of Mozambique (he is the foremost American expert on that country) depict the evolution of the former Portuguese colony through resistance and revolution into the present-day beleagured socialist state. Highly sympathetic to the aims of the ruling party, the authors eschew rhetoric in favor of a very useful collation of information on its economic programs and political directions. Completed a year ago, some of the analysis has been overtaken by the recent broad escalation of MNR subversion.

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Janet Rigney

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ERRATUM

America and the World 1983

In William P. Bundy's "A Portentous Year": on page 511, the second sentence of footnote 32, concerning the appointment to the Kissinger Commission of Professor Diaz-Alejandro, was factually in error as to any confusion with his brother and as to his brother's political views. The sentence should read: "The only member with long living experience in the area was Professor Carlos F. Diaz-Alejandro, a distinguished Yale economist with a strong Latin America suit." The Editor deeply regrets the error.

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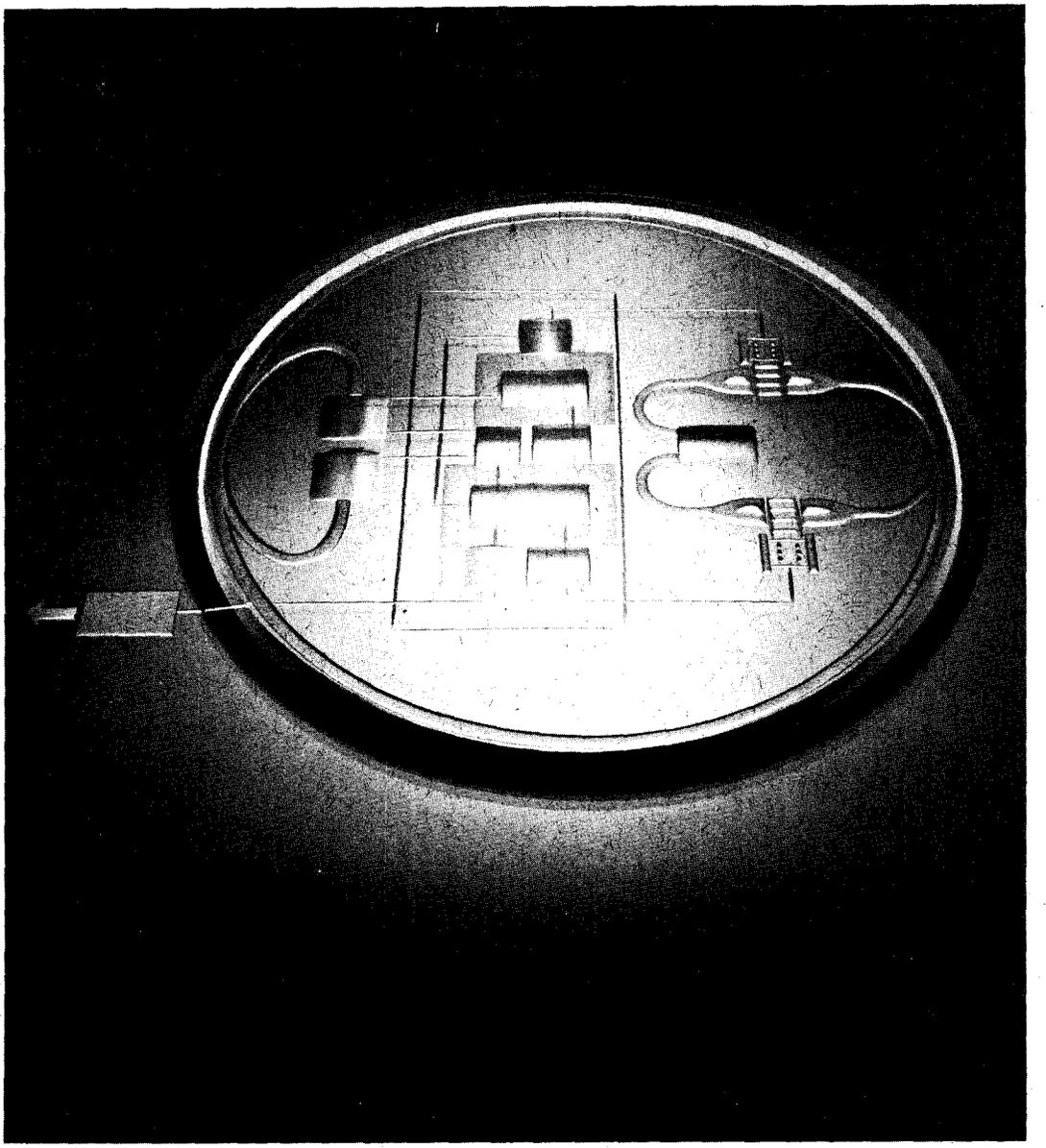

Crystal clear. Wafer thin. Flawless in its composition. Inscribed with a channel through which two opposing circles of light travel at extraordinary speed. This is the heart of the Micro Optic Gyroscope, developed by Northrop Corporation's Precision Products Division, Norwood, MA. Using micro-electronics, the difference in resonance between these two circles of laser light is measured, exactly. The Micro Optic Gyro combines precision measurement with greatly reduced cost. From the worldwide leader in precision inertial instruments.

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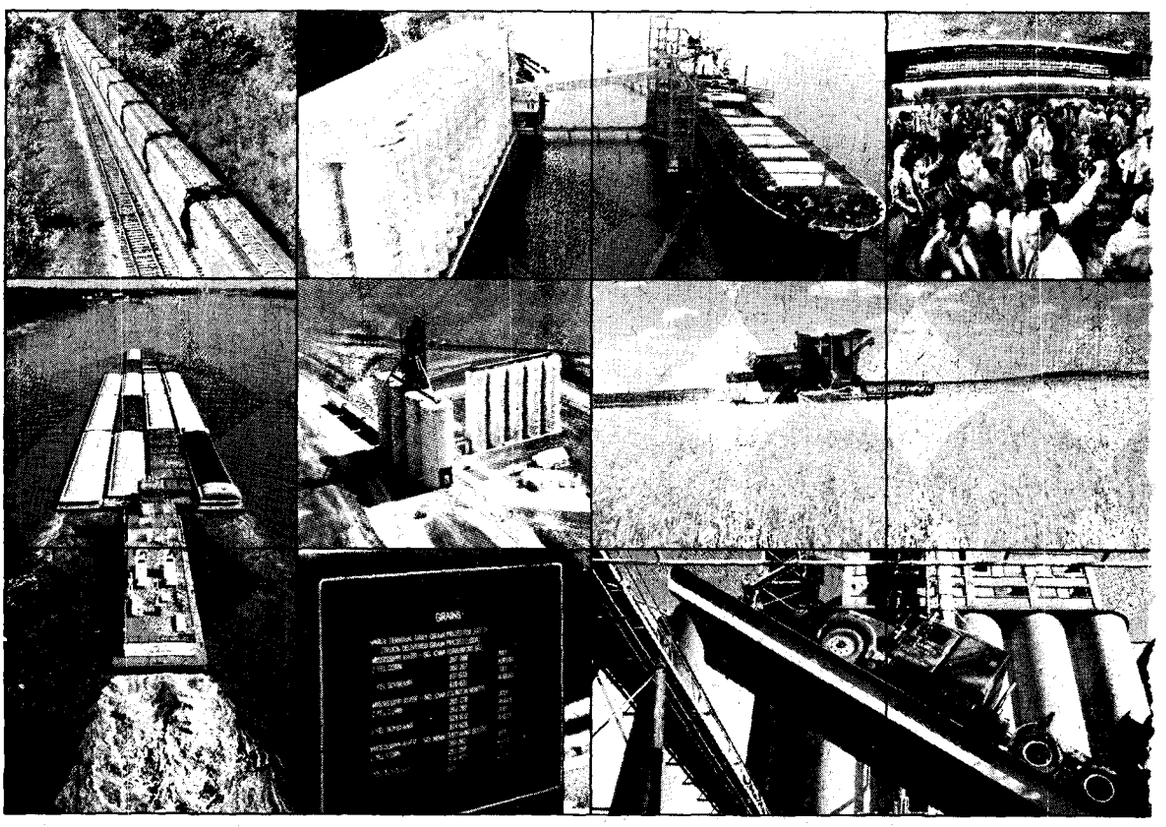

The U.S. grain marketing system. It's the major free, open, competitive one in the world.

And the most successful as well.

It's allowed the U.S. to increase its share of world grain trade from less than 40% two decades ago to over 55% today.

Unlike many countries where government agencies can impose marketing decisions, our system lets farmers sell as much as they want, to whomever they want, whenever they want. And all grain merchants must compete for this grain by paying competitive prices...prices that are instantaneously flashed around the world to sellers and to buyers alike.

Anywhere in the world, buyers can bid for U.S. grain on equal terms with each other and with our domestic consumers. They pay competitive prices —no more, no less.

Our open market system insures competitive prices because it quickly reflects all the known supply/demand forces at work around the world each day. The knowledge that this market will remain open, furthermore, has led to ever greater investments by those who receive, store, transport, pro and export all the grain that farr wish to sell...or importers are wi to buy.

There is, to be sure, a role for ernment in this market. But the dom to trade is what makes our g marketing system work. It's also v has made our system the envy of world.

Continental Grain Company, Park Avenue, New York, NY 10172.

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When it comes to marketing grain, you can't beat the system.

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